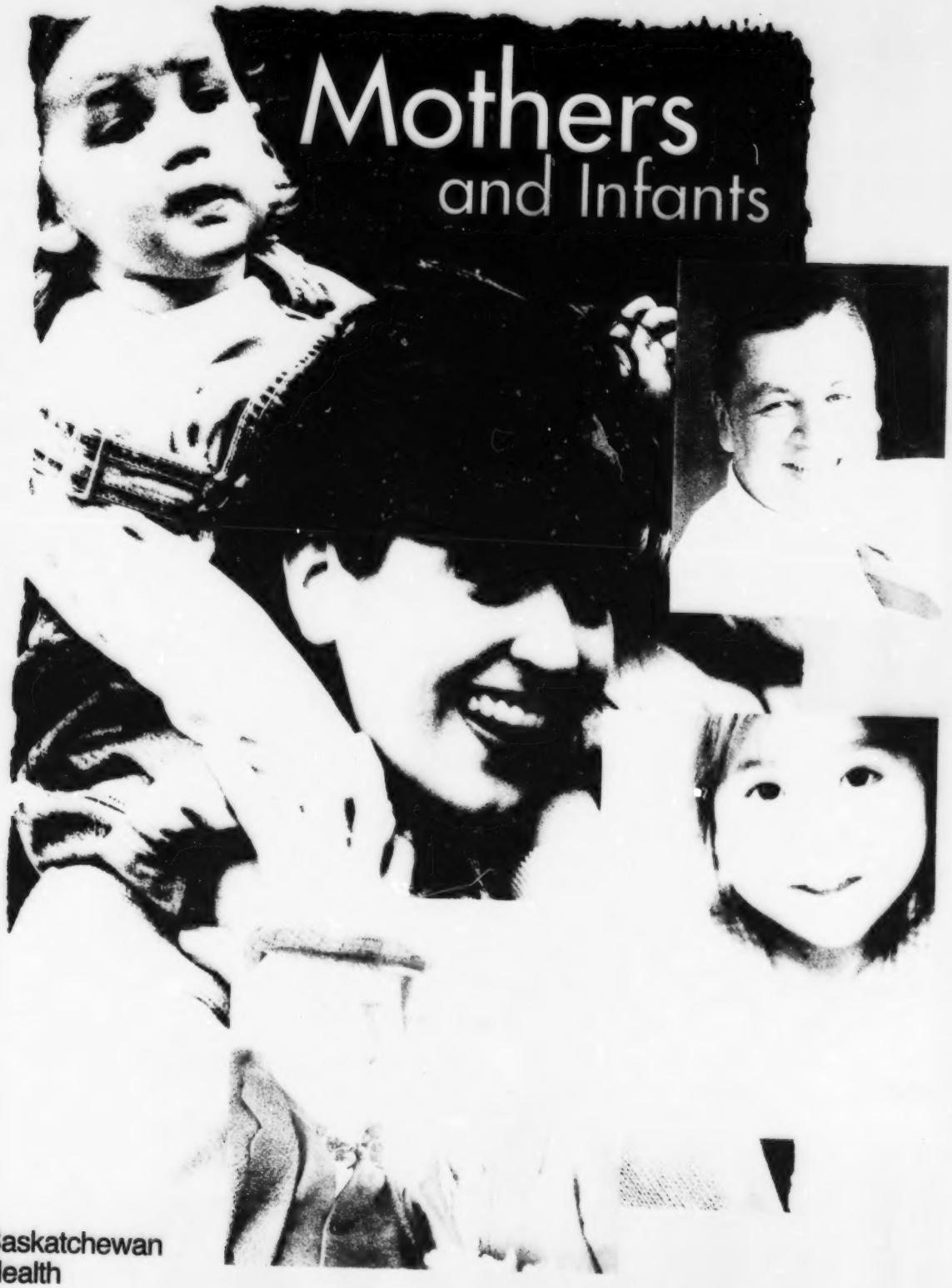
Mothers and Infants



Saskatchewan Health

100-04276/

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INTRODUCTION

Residents of Saskatchewan place a high value on their health and their health system. Quality and accountability of the Saskatchewan health system are, therefore, significant issues for members of the public, health system clients, health professionals, and other interest groups.

In recent years, many changes have occurred in the design, structure, and delivery of health services in Saskatchewan. This has been coupled with an increase in economic and geographic challenges to health services delivery and a shift in the demographic profile of the Saskatchewan population. Given this context, it is an opportune time to initiate the systematic collection, investigation, and reporting of information on the effectiveness of health services and the overall health of Saskatchewan residents.

This report is the first in a series of four reports designed to examine key aspects of Saskatchewan's health system. Each report focuses on a single client group that places unique demands on the health system. This first report focuses on the health of mothers and infants through the presentation of information and data on high-level indicators of health outcomes and health service utilization.

It is impossible to measure everything about the health system; it would be an overwhelming task to capture and use data on multiple measures. High-level indicators are useful because they are broad-based measures that can be used to describe critical components of health system functioning. A small set of high-level indicators represents a concise body of information that encourages understanding of key issues and facilitates use of this information in decision making.

The Health District Advisory Committee Information Needs Working Group was established in the fall of 1996 to oversee the creation of a framework and strategy for developing and implementing health indicators. Specifically, the Working Group was charged with the task of developing comprehensive, comparative information that could be used to facilitate evidence-based planning and decision-making within Saskatchewan health districts.

A committee consisting of representatives from the health districts and Saskatchewan Health undertook the process of recommending indicators for this report to the Information Needs Working Group. The committee was comprised of individuals who could provide expert knowledge of the major health issues facing the maternal and infant population, or of the technical issues underlying the development of high-level health indicators.

This committee had as its primary objective, the development of a set of core indicators which represent the minimum essential information required by health districts for program planning, decisions concerning resource allocation, and health needs assessment. The recommended set of core indicators

includes five measures for which data are currently collected. Two additional measures are proposed for future development.

This report begins with an overview of the Saskatchewan Framework for Health Service and Outcome Indicators and the criteria that were used to select indicators for the Framework. For each of the high-level core indicators selected for the report, current, provincial data are provided, wherever possible. This data is described within the context of various factors that may influence the numeric value of the indicator. The potential impact that a core indicator may have on other measures of health status and health service use is discussed. Opportunities for acting on the results of an indicator are also described. Finally, technical details of the definitions and data sources of each of the core indicators discussed in this report are provided in an appendix, along with details of statistical analyses.

Subsequent reports will focus on the three remaining population groups identified in the Saskatchewan Framework for Health Service and Outcome Indicators: children and youth, adults, and seniors. Work is currently under way to select, define, and report on high-level indicators for each of these segments of the Saskatchewan population.

To order additional copies of this report please contact:

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THE SASKATCHEWAN FRAMEWORK FOR HEALTH SERVICE AND OUTCOME INDICATORS

The development of the Saskatchewan Framework for Health Service and Outcome Indicators began with consideration of the concept of *quality*. However, rather than focussing on the re-creation of a definition of *quality*, work centred on the development of a framework which would incorporate the dimensions of quality, doing so within the context of a client-centred health system.

There are three dimensions of quality incorporated in the Saskatchewan Framework for Health Service and Outcome Indicators. These are described below along with key questions that need to be addressed in developing indicators of a quality health system.

❖ *Steps to Good Care*

Delivering services involves both inputs and processes. *Inputs* include both financial and non-financial resources, with a particular emphasis on people and their knowledge and skills. *Processes* refer to the technical and interpersonal aspects of activities or things done to or for targeted individuals or groups.

Question: How well is the system delivering needed services across the continuum of care?

❖ *Satisfaction*

Satisfaction has multiple dimensions, and covers such topics as convenience and accessibility of services. However, satisfaction is also a much broader issue, that encompasses the extent to which individuals are empowered to manage or cope with their own illnesses, and to use information in order to lead a healthier life. While an understanding of the level of satisfaction that clients have with the services that they use is essential, the concept of satisfaction must be viewed from a wider perspective. Health professionals who are happy with the environment in which they work will be more productive. As well, current non-users of the health system who experience satisfaction with the system may feel reassured that care and services will be available and accessible when they are needed.

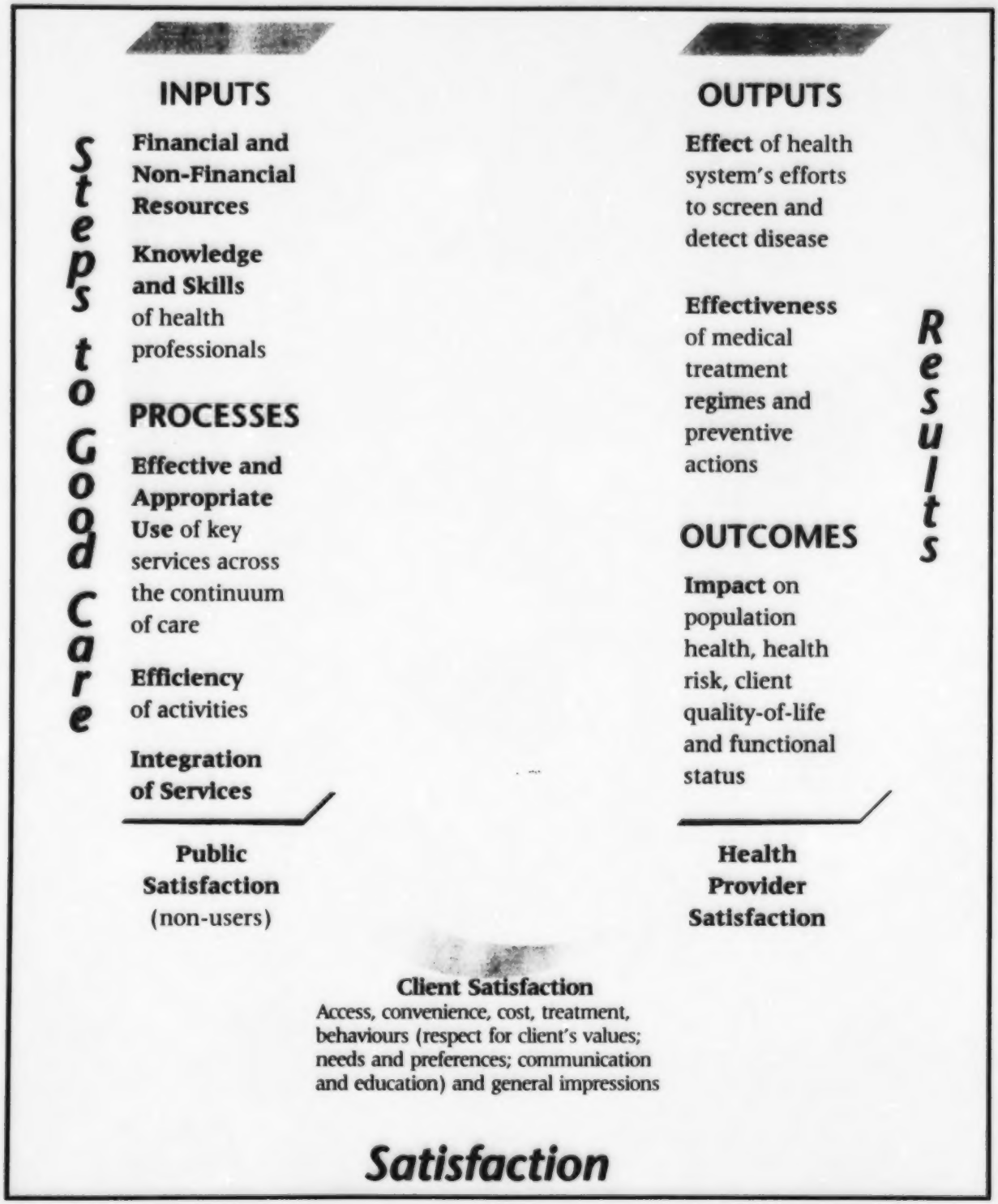
Question: How satisfied are people with the care and services they receive and with their role in decisions about their health care needs?
Question: How satisfied is the public, including non-users of the health system, with both the care and services that are available and the value received for the money spent?
Question: How satisfied are health providers with the system in which they work?

What is Quality?

The definition of quality developed by the Canadian Council on Health Services Accreditation (CCHSA) was used to guide development of the Saskatchewan Framework:

Doing the right thing, doing it well, and satisfying the customer.

Saskatchewan Framework for Health Service and Outcome Indicators


Steps to Good Care
INPUTS
Financial and Non-Financial Resources
Knowledge and Skills of health professionals
PROCESSES
Effective and Appropriate Use of key services across the continuum of care
Efficiency of activities
Integration of Services
Public Satisfaction (non-users)
OUTPUTS
Effect of health system's efforts to screen and detect disease
Effectiveness of medical treatment regimes and preventive actions
OUTCOMES
Impact on population health, health risk, client quality-of-life and functional status
Health Provider Satisfaction
Results
Client Satisfaction
Access, convenience, cost, treatment, behaviours (respect for client's values; needs and preferences; communication and education) and general impressions
Satisfaction

❖ ***Results***

Measuring results involves examining both outputs and outcomes. Outcomes reflect the measurable impact of programs and services on population health. Outputs refer to the effectiveness of screening or detection services and medical treatment regimes.

Question: What is the impact on population health status, client needs, client quality-of-life, and decisions regarding delivery infrastructure?

The Framework is further intended to depict the relationships that exist among the various dimensions of quality. Assessing the demographic characteristics of clients and potential clients is an essential step in planning health system inputs and processes for service delivery. Examining such factors as the age and sex structure of the population, the population growth rate, age-specific fertility rates, school enrollment, and selected socio-economic indicators, can assist in building a profile of both current and future clients. Client characteristics are an important tool in the process of needs assessment.

Using the Framework

The Saskatchewan Framework has been designed to enable the assessment of whether health system quality improvements have been achieved. This can be accomplished through the use of objective, evidence-based indicators as well as more subjective measures. The overall goal is that the collection and use of data will aid efforts to improve the health system and, at the same time, make it more responsive to the needs of the people it serves.

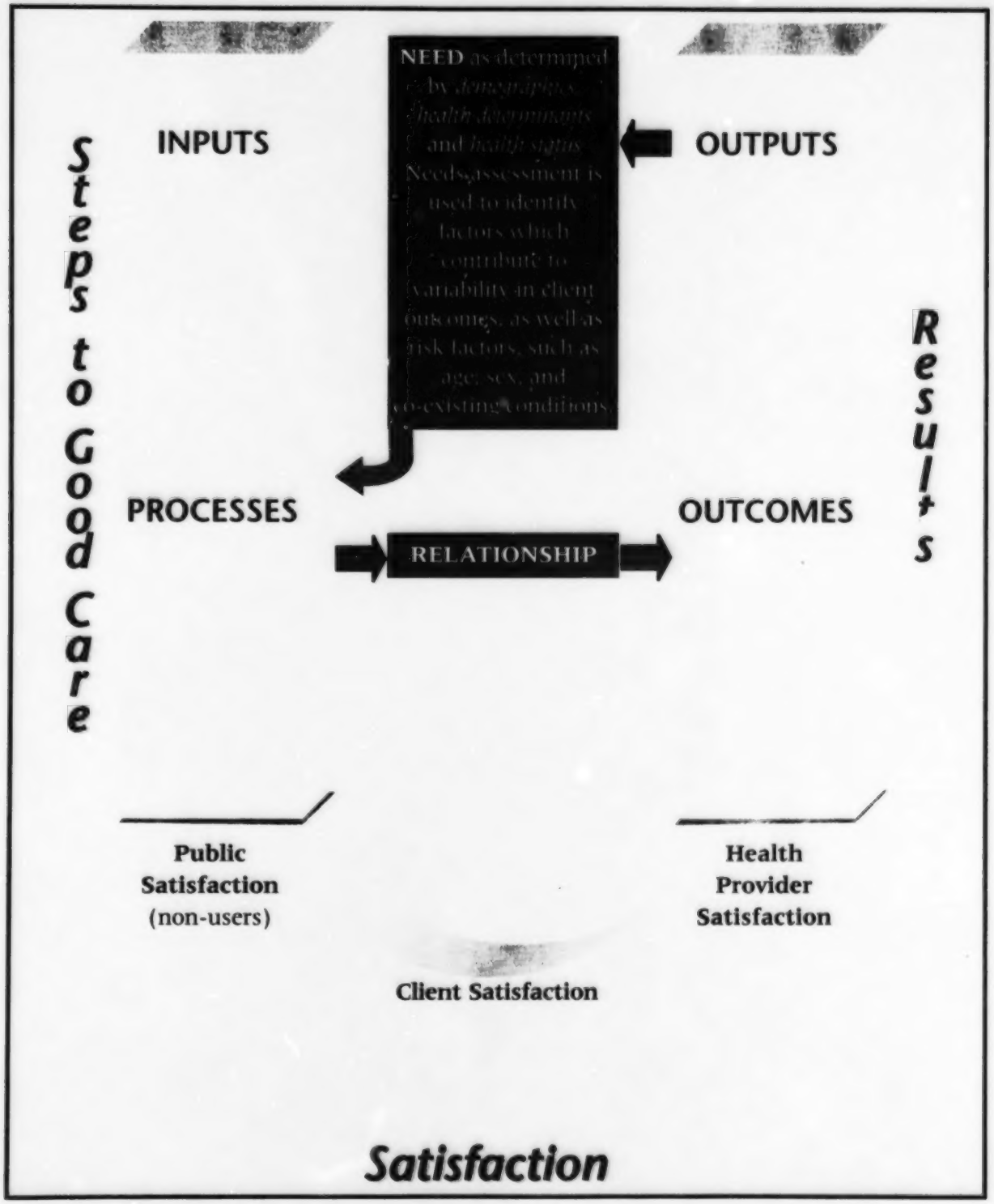
Defining health needs also requires the recognition that health services are just one of many factors that contribute to the health, well being, and quality of life for individuals and communities. No single factor, including health services, is responsible for the health of individuals or populations; rather, health is the result of the interaction of many contributing factors. The quality of air and water, the interaction of behaviour and genetics, and the conditions where people live, work and play are all important. In addition, health is greatly influenced by social supports, which include family, friends, and communities. The type of influence/control that the health system can exercise with respect to these factors depends upon

Responsibility for Change: The Role of the Health System

Example #1: *The number of infant deaths which occur each year is influenced by a number of factors, including substance use, maternal nutrition during pregnancy, birth weight, and adequacy of prenatal care. Women who receive a full series of prenatal visits are at lower risk for having a low birth weight baby than women who receive no prenatal care. Low birth weight, which has several causes, is the principal risk factor associated with infant mortality. While the health system may be able to influence some of the factors which have an impact on infant mortality, some are clearly outside the direct responsibility of the health system. Therefore, intersectoral collaboration and community participation are essential to achieving real improvement in the health status of individuals and populations.*

Example #2: *The rate of immunization for specific communicable diseases is almost entirely within the control of the health services system because it has responsibility for both the purchase and distribution of vaccines. Any change in the rate of vaccine-preventable disease can be very strongly influenced by the delivery of immunization services.*

Saskatchewan Framework for Health Service and Outcome Indicators


NEED as determined by demographics, health determinants and health status. Needs assessment is used to identify factors which contribute to variability in client outcomes, as well as risk factors, such as age, sex, and co-existing conditions.
INPUTS
OUTPUTS
PROCESSES
OUTCOMES
RELATIONSHIP
Steps to Good Care
Results
Public Satisfaction (non-users)
Health Provider Satisfaction
Client Satisfaction
Satisfaction

the level of responsibility attributed to the health system. There are three main categories:

- ***Action*** – the health system has sole responsibility;
- ***Action/voice*** – the health system shares responsibility with others in the community; and
- ***Voice*** – responsibility rests exclusively with others in the community.

Finally, the Framework is intended to demonstrate the impact that good care can have on results. Changes in the delivery of programs and services, which are based on assessment of client needs, should have an impact on one's level of satisfaction with the system. As well, modifications in the structure of the health system and the manner in which services are delivered are expected to have an impact on the results that are achieved.

These are important elements of program planning and decision making that may ultimately lead to changes in the programs and services delivered. Hence a circular process is depicted, in which assessment of client needs has the opportunity to influence programs and services, which in turn impacts on population outcomes and satisfaction with the system, which ultimately serves as a vehicle for refinement and further change.

Framework Focus

In the Saskatchewan Framework, a client/patient focus, differentiated by population group, has been adopted. The four population groups selected are:

- Mothers and Infants,
- Children and Youth,
- Adults, and
- Seniors.

A number of alternatives such as program, disease, and function grouping were considered; however, a client/patient focus was selected for two key reasons. The most important reason, perhaps, is that health care services are client focused in nature. The second reason is the new accountability relationships which resulted from the reorganization and restructuring of the province's health system which was begun in August 1992.[1]

Selecting Indicators for the Framework

Indicators for the *Steps to Good Care* and *Results* dimensions of the Framework are presently being developed for each of the four population groups. Working groups comprised of representatives from the health districts, Saskatchewan Health, and other government and non-government agencies are engaged in the selection of indicators.

[1] As noted in *A Framework of Accountability, The Minister of Health and District Health Boards* (October, 1995), "district health boards are now accountable for the overall health of their district's residents – a responsibility never before included in a government board's mandate. Specifically, the district boards have responsibility and authority for:

- assessing needs of persons to whom they provide services;
- planning, managing, delivering and integrating the provision of health services;
- promoting health and wellness; and
- cooperating with and/or entering into agreements with the Governments of Canada or Saskatchewan, district health boards, Indian bands, the Metis Nation of Saskatchewan, or any other person or group for the provision of health services."

The development of indicators that pertain to the *Satisfaction* dimension of the Framework will be undertaken in a later phase of this project. Presently, many health districts are collecting information on client satisfaction with services. However, an overall provincial strategy, which is based on the Saskatchewan Framework, has not yet been developed.

The screening processes that are used to develop indicators for the Framework include the following:

Usefulness

- ✓ Does it represent an important contribution to the health of the population group in question? Or, does it represent an important health issue or problem? Factors considered in this regard include the number of people affected, impact on future health status, and severity of impact.
- ✓ Can something be done to improve services or outcomes?
- ✓ Is there an existing or potential impact on district health board resources, including both financial and non-financial impacts (indication of linkage with district health board goals and role)?

Feasibility

- ✓ Are data available? If not, consideration is given to the feasibility and cost of collecting the data.
- ✓ Are the data of acceptable quality/ quantity?

Validity and Reliability

- ✓ Are the data capable of being used at different levels of aggregation? Are the data, for example, meaningful at a district level?
- ✓ Does the indicator measure what it purports to measure? Is it easily understood?
- ✓ Is there potential for error (i.e. false negatives, which occur when the measure fails to identify deficiencies that actually exist, or false positives, which occur when the measure identifies deficiencies that do not exist)?
- ✓ Is the indicator reliable (i.e. ability to identify the same result after repeated measures, or when different individuals take the same measurement)?

Overall Screening

Finally, the usefulness of a *set* of indicators for a specific population group can be assessed against the following criteria:

- ✓ Do the indicators span the continuum of care, thereby representing the full spectrum of health services?

INDICATOR #1: PRENATAL CARE

Seeking prenatal care early in one's pregnancy and maintaining a consistent pattern of care are positive actions towards having a safe pregnancy and a healthy baby. Women who do not receive adequate prenatal care may be at risk for pregnancy complications, as well as negative birth outcomes such as still births, low birth weight babies, and infant deaths.

Because prenatal care is universally available at no direct cost in Canada, the vast majority of women do utilize it. National figures from the Longitudinal Survey of Children and Youth suggest that more than 95% of mothers receive care from either physicians, nurses, or midwives during their pregnancies.[2] However, full participation by women in prenatal care has not been realized. Impediments to accessing and receiving care do exist, including cultural, geographic, and socioeconomic barriers.

Both the continuity of care and the early initiation of care are factors that can be used to measure the adequacy of prenatal care. The timing of the first prenatal care visit to a physician and the total number of physician visits are typically used to describe the adequacy of prenatal care. With respect to the first of these factors, it is well accepted that prenatal care should be initiated in the first trimester of pregnancy. The total number of visits recommended for adequate care is based on the length of the gestation period. Thus, women delivering pre-term infants require fewer visits in order to receive adequate care than those women delivering infants of full term.

Why Focus on this Indicator?

Adequacy of prenatal care utilization provides an indication of the number of women who may experience less than optimal birth outcomes. As well, it provides an indication of the number of women who may experience difficulty in accessing prenatal care providers.

Indicator Results

The prenatal care of 15,912 women was examined for an eighteen-month period between January 1994 and March 1995. Using the Kessner Index,[3] 85% of these women were classified in the *adequate* category, 9% were placed in the *intermediate* category, and 6% were assigned to the *inadequate* category.[4]

Indicator Definition

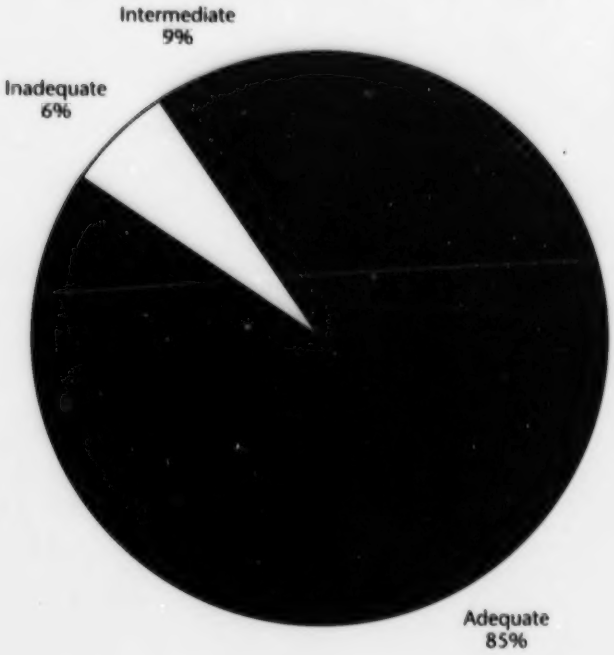
Saskatchewan's measure of prenatal care is based on the Kessner Index, which was created by the US Institute of Medicine. With this index, adequacy of prenatal care is based on the total number of physician visits received by an individual, adjusted for the length of the gestation period and the timing of the first visit. Individuals are classified into one of three groups using the Kessner Index– adequate, intermediate, and inadequate.

[2] McIntyre, L. (1996). Starting out. In *Growing up in Canada: National longitudinal survey of children and youth* (pp. 47-56). Ottawa, ON: Human Resources Development Canada and Statistics Canada.

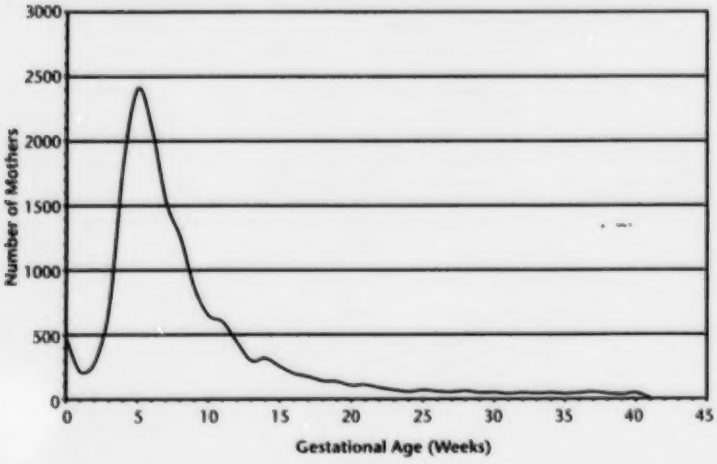
[3] The scoring algorithm for the Kessner Index is given in Appendix A. Adequate care must begin in the first trimester of pregnancy and must follow a prescribed number of minimum visits. Inadequate care encompasses all women who do not begin prenatal care until after the sixth month of their pregnancy.

[4] The data reported here are based on the population of women giving birth to a live infant between January 1, 1994 and March 31, 1995. There were a total of 16,715 live births during this period. All women having a multiple birth (e.g., twins, triplets) were excluded from the data set because birth status is known to be a confounding factor in defining adequate care. All women having second births in this 15-month period were also excluded. Additional exclusions resulted from data quality checks.

Adequacy of Prenatal Care, 1994-95



Timing of First Prenatal Care Visit



It is widely recommended that a woman's first prenatal care visit should occur in the first trimester of pregnancy, that is, by the 13th week of the pregnancy. For the women in this study, 83% had at least one prenatal visit by this time. Another 13% had at least one visit by the end of the second trimester. However, 4% of the women did not receive care until the third trimester of the pregnancy.

Adequacy of prenatal care was investigated for women who had either a pre-term birth or a post-term birth. A pre-term birth is one that occurs before the 37th week of gestation, while a post-term birth is one that occurs after the 41st week of gestation. Compared with women who had a full-term birth, both of these groups of women were more likely to receive intermediate or inadequate care.

Some women will give birth to infants with an at-risk birth weight. These include low weight infants, who weigh less than 2,500 grams at birth, as well as high weight infants, who weigh more than 4,000 grams at birth. The data were examined to determine if any relationship existed between adequacy of prenatal care and birth weight. No such relationship was identified.

However, adequacy of care did vary with maternal age. Only 71% of women under 20 years of age were

Key Results

- *85% of women in Saskatchewan receive adequate prenatal care according to the Kessner Index.*
- *More than 80% of women begin receiving prenatal care in the first trimester of pregnancy.*
- *Adequacy of prenatal care varies with maternal age; adolescents may be at risk for a lack of adequate care.*

assigned to the *adequate* category, compared to 86% of women between the ages of 20 and 29 years and 88% of those between the ages of 30 and 39 years. Finally, 83% of women 40 years of age or older were identified as receiving adequate care.

National and Inter-Provincial Comparisons

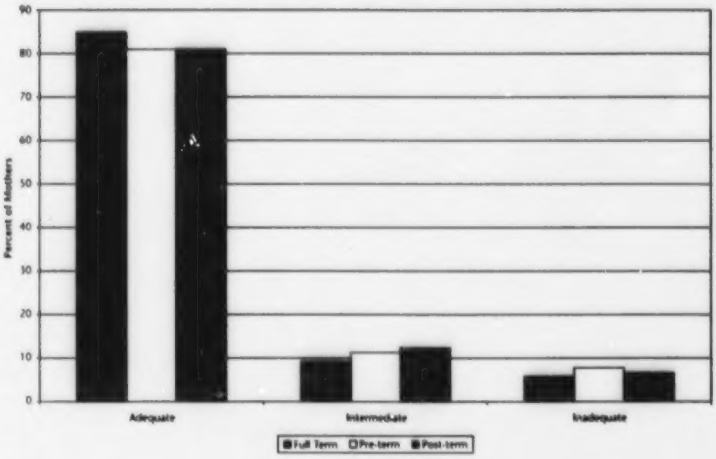
National comparison figures on adequacy of prenatal care are not available. However, a 1994 study of prenatal care utilization among residents of Winnipeg for an 18-month period in 1987-88 reported that 74% of women received adequate care and 9% received inadequate care.[5]

What Influences this Indicator?

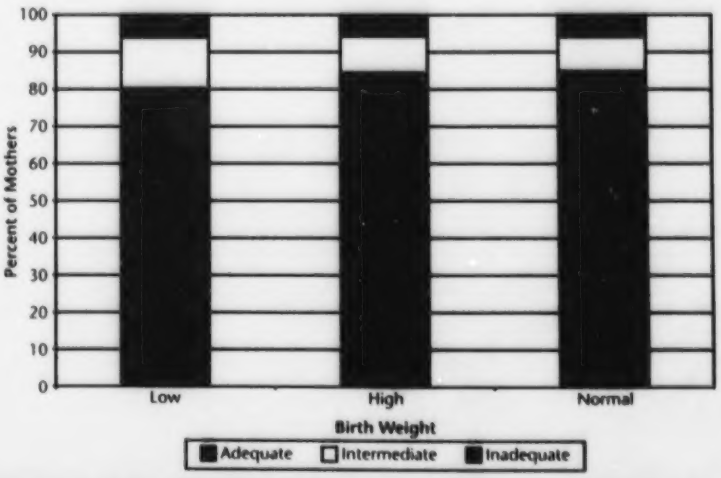
The factors that may influence adequacy of prenatal care include:[6,7,8]

- ***Provider availability:*** Limited availability of prenatal care providers, especially in geographically isolated and rural areas, as well as an insufficient number of prenatal care providers at those sites that are routinely used by high-risk populations, may contribute to a lack of adequate care.
- ***Personal experiences and perceptions:*** Women's past experiences, attitudes, and beliefs concerning both the health system and specific prenatal care providers may influence their use of prenatal services. Perceptions of an "unfriendly system", psychological discomfort during physical examinations performed by male doctors, or fear of pressure for an abortion from medical staff are all factors that may impact on the initiation and continuation of prenatal care.

Adequacy of Prenatal Care by Type of Birth



Adequacy of Prenatal Care by Birth Weight



[5] Mustard, C. A., & Roos, N. P. (1994). The relationship of prenatal care and pregnancy complications to birthweight in Winnipeg, Canada. *American Journal of Public Health, 84*. 1450-1457.

[6] Curry, M. (1989). Nonfinancial barriers to prenatal care. *Women and Health, 15(3)*. 85-97.

[7] Morton, A. M., & Loos, C. (1995). Does universal health care coverage mean universal accessibility? Examining the Canadian experience of poor, prenatal women. *Women's Health Issues, 5*. 139-142.

[8] Sokoloski, E. H. (1995). Canadian First Nations women's beliefs about pregnancy and prenatal care. *Canadian Journal of Nursing Research, 27*. 89-100.

- ***Lack of awareness:*** Some women may not understand the benefits of receiving early and continuous prenatal care.
- ***Personal barriers:*** These include transportation problems, lack of childcare, and the inability to obtain time away from work or school.
- ***Recruitment efforts:*** Attempts to recruit women into the health care system may be inadequate. In other words, there may be a lack of understanding, on the part of health professionals, of the factors that motivate women to seek prenatal care.
- ***Attitudes towards the pregnancy:*** This includes feelings of ambivalence, fear, and denial experienced by the mother. As well, the attitudes displayed by family and friends toward the pregnancy may influence maternal behaviours concerning prenatal care.

Potential Impact

Changes in the adequacy of prenatal care may have an impact on the following outcome measures:

- ***Birth weight:*** Several studies conducted in the US have shown that infants born to mothers receiving less than adequate care are more likely to weigh less than infants born to mothers receiving intermediate or adequate care.[9, 10] Hence, inadequate prenatal care may be a risk factor for low birth weight.
- ***Early childhood development:*** Early identification of conditions that may threaten maternal and fetal health permits intervention at a stage before serious damage occurs. This may impact on a child's physical or mental development.

Opportunities for Action

- *Educational strategies to promote the benefits of early and continuous prenatal care.*
- *Programs to improve the accessibility of prenatal care services, such as outreach programs.*

What are the Limitations of this Indicator?

- It may be difficult to increase the numeric value of this indicator by any significant amount even with aggressive promotion and education. An upper threshold may have been achieved.
- The number of prenatal care visits does not provide information on the quality of these visits, the amount of time physicians spend with each individual, or the quantity or type of health-related information imparted to pregnant individuals.

Why Monitor this Indicator?

✓ To encourage the development of educational and promotional strategies directed at key segments of the maternal population. These segments could include women who initiate care late in the pregnancy, who do not receive a sufficient number of visits, or who do not access care at all.

✓ To stimulate discussion on changes in the structure, content, and delivery of prenatal care services. The US Department of Health and Human Services convened an Expert Panel on the content of

[9] Alexander, G. R., & Cornely, D. A. (1987). Prenatal care utilization: Its measurement and relationship to pregnancy outcome. *American Journal of Preventive Medicine, 3,* 243-253.

[10] Showstack, J. A., Budetti, P. P., & Minkler, D. (1984). Factors association with birthweight: An exploration of the roles of prenatal care and length of gestation. *American Journal of Public Health, 74,* 1003-1008.

prenatal care to examine the services pregnant women should receive, as well as issues related to distribution of these services. The three essential components of prenatal care identified by the Expert Panel are: (a) early and continuing risk assessment, (b) health promotion, and (3) medical and psychosocial interventions and follow-up.[11]

✓ To raise awareness of the relationship between adequacy of prenatal care and birth outcomes.

[11]Sable, M. R., & Herman, A. A. (1997). The relationship between prenatal health behavior advice and low birth weight. *Public Health Reports, 112*, 332-339.

INDICATOR #2: AVOIDABLE HOSPITALIZATIONS OF INFANTS

Why Focus on this Indicator?

Hospitalization rates among infants for potentially avoidable conditions provide an indication of the availability, accessibility, and use of primary care services by the infant population.

Hospitalization of a young child due to illness is an unwelcome prospect for many families. It can be a source of emotional stress for family members, disrupt the normal routine of the family, and result in parents having to take time away from work or school. As well, a hospital stay exposes the infant to the possibility of complications arising from medical treatment, and in-hospital infections or illness resulting from increased human contact.

Indicator Definition

Saskatchewan's avoidable hospitalization rate for infants is defined as the number of hospitalization episodes for ambulatory care sensitive (ACS) conditions. It includes all children who are under one year of age at the time of admission to hospital, and is expressed as a rate per 1,000 infants.

ACS conditions include:

- *Chronic diseases, such as asthma and diabetes;*
- *Severe ear, nose, and throat (ENT) infections;*
- *Pneumonia;*
- *Epileptic convulsions;*
- *Gastroenteritis and dehydration;*
- *General infections, including kidney/urinary infections and those which are preventable through immunization;*
- *Nutritional conditions, such as failure to thrive and iron deficiency anemia;*
- *Dental conditions.*

For children under one year of age, some hospitalizations may be avoided through timely and effective primary care practices. One such practice is immunization, which can help to prevent the spread of illness from such diseases as measles, mumps, and whooping cough. As well, early detection and proper management of chronic conditions such as asthma may help to avoid hospitalization. In general, avoidable hospitalizations include conditions or illnesses that can be effectively managed, controlled, or treated through the provision of timely, appropriate, and effective primary care.[12]

Avoidable hospitalizations have significant financial implications for the health system. Hospitalizations account for a large proportion of the total expenditures for infant health; a decrease in the number of hospitalizations could release funds and resources for enhanced community-based primary care initiatives.

Indicator Results

In the 1997/98 fiscal year, there were 1,397 hospitalizations of infants for ACS conditions: 30% of these were for bacterial pneumonia; 21% were for severe ENT infections; another 18% were for chronic diseases. While the last category includes both asthma and diabetes, there were no infant hospitalizations for diabetes in the 1997/98 fiscal year. A total of 1,243 infants were hospitalized at least once

[12] Irvine, J. (1998, April). *Pediatric hospitalizations for ambulatory care sensitive conditions: A comparative study of Saskatchewan registered Indians and northerners with rural and urban Saskatchewan children.* Master's thesis, University of Manitoba, Winnipeg, MB.

because of an ACS condition in this year. This represents approximately 10% of all children in this age group.

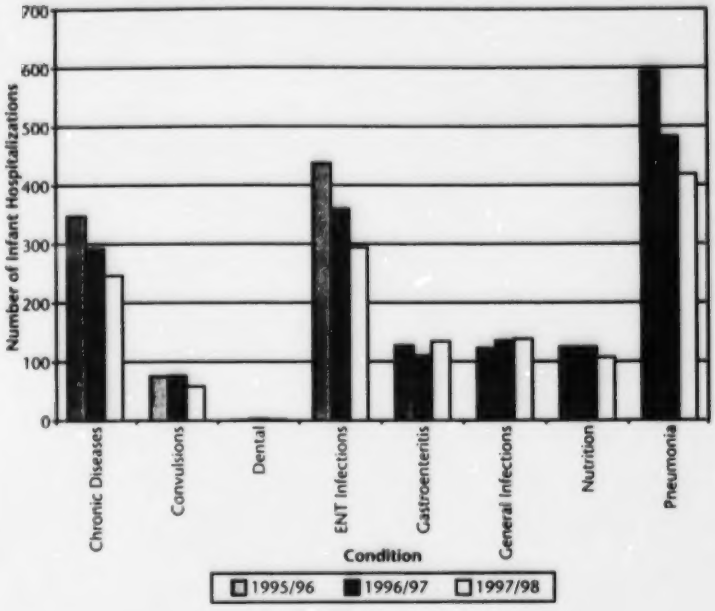
The total number of infant ACS hospitalizations, as well as the annual rate, has shown a continual decline since the 1990/91 fiscal year, the first year for which data are compiled. In 1990/91, there were a total of 2,562 hospitalizations, and the rate was 163 per 1,000 infants. By 1997/98 the rate had fallen to 113, a decrease of 31%.

Prior to the 1994/95 fiscal year, severe ENT infections accounted for the largest proportion of all ACS hospitalizations in Saskatchewan. The hospitalization rate for these infections has dropped substantially over time. Since 1994/95, bacterial pneumonia has overtaken ENT infections in accounting for the largest proportion of all ACS hospitalizations.

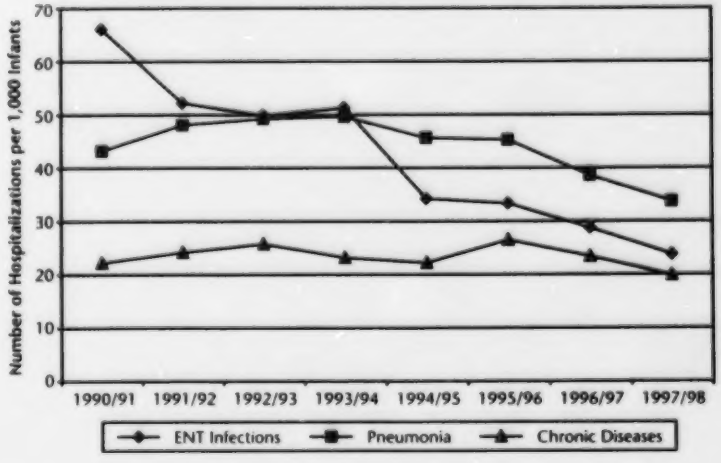
Between 1996/97 and 1997/98, rates of infant hospitalization for ENT infections, pneumonia, chronic diseases, convulsions, and nutritional conditions decreased, although the differences were small and not statistically significant for all but ENT infections. The rates of infant hospitalization for gastroenteritis and general infections increased slightly between these two time periods, although the results were not statistically significant.

Despite these encouraging results, the data reflect some serious issues for Saskatchewan infants. Given that Registered Indians represent only about 18% of all infants in the province, a disproportionately high number of infant hospitalizations are for this population group. In 1997/98, two thirds of the 418 infant hospitalizations for pneumonia were

Types of ACS Hospitalizations of Infants



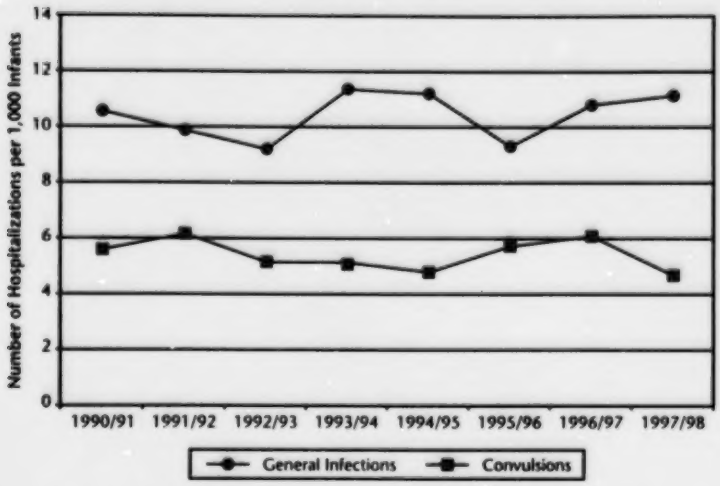
Trends in ACS Hospitalizations, I



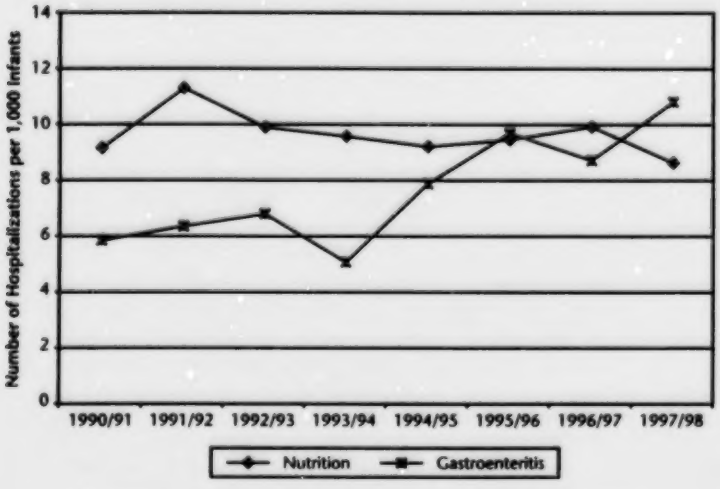
Key Results

- *Pneumonia, severe ENT infections, and asthma account for approximately 70% of all ACS infant hospitalizations.*
- *One third of all infant hospitalizations are for ACS conditions.*
- *Registered Indians account for a disproportionately high number of ACS hospitalizations of infants.*

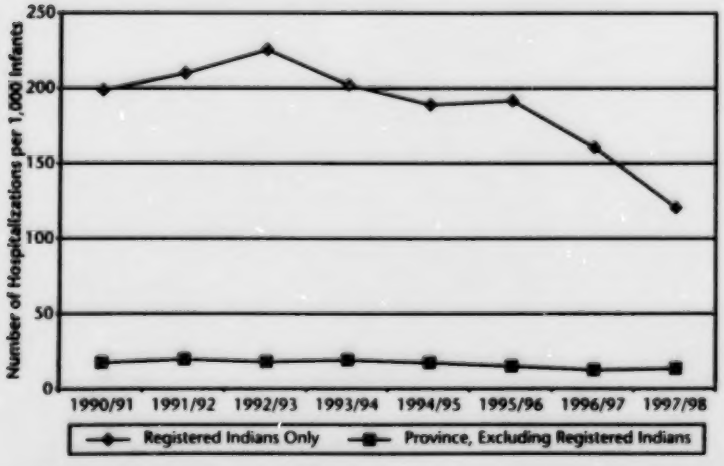
Trends in ACS Hospitalizations, II



Trends in ACS Hospitalizations, III



ACS Hospitalizations for Pneumonia



for Registered Indian infants; the rate of these hospitalizations among the Registered Indian infant population was 121 per 1,000, while for the rest of the infant population it was only 14 per 1,000. Furthermore, 60% of infant hospitalizations for severe ENT infections were for Registered Indians; the rate among this population group was 60 per 1,000 while for the rest of the infant population it was only 15 per 1,000. This information suggests that the greatest reductions to be made in infant hospitalizations for ACS conditions can be found by focussing on the Registered Indian population, although it is not yet clear why these large differences exist or how they can be remedied.

Provincially, approximately one third of all infant hospitalizations in the 1997/98 fiscal year were for ACS conditions. The proportion of all infant hospitalizations with an ACS diagnosis has changed very little over the last seven years.

National and Inter-Provincial Comparisons

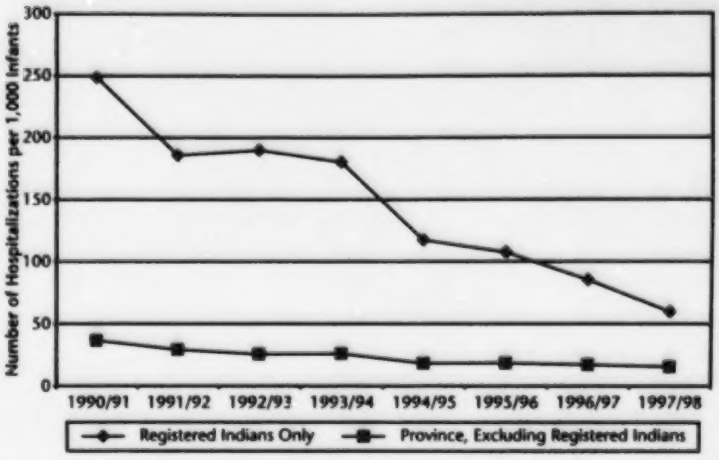
No national figures for comparisons of the infant ACS hospitalization rate are presently available. However, rates of avoidable hospitalizations are being explored in other jurisdictions. For example, the Canadian Institute for Health Information (CIHI) has proposed that this indicator be used as a measure of potentially inappropriate utilization of services for regional comparison purposes.

What Influences this Indicator?

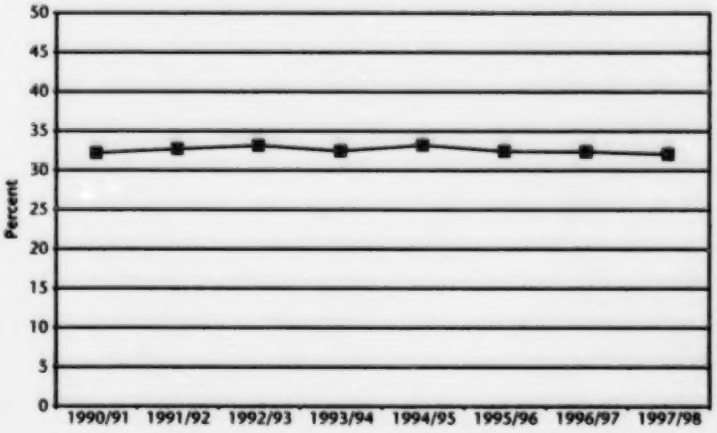
The following factors may influence the rate of infant hospitalizations for ACS conditions:[13, 14, 15]

- ***Type and mix of primary care services:*** This includes the type of physician services that are available in a community or accessible to a geographic location, the availability of other health professionals, use of emergency rooms for treatment and care, the organization and mix of available outpatient resources (e.g., community outreach programs), and the availability and quality of health education resources.
- ***Health care seeking behaviour of the parent or other caregiver:*** The parent/caregiver's prior experience and self-confidence in navigating the health care system, ability to recognize when care is needed, and ability to comply with directions for managing a condition or illness are all factors in determining when and where care is sought and how well an episode of illness is managed outside of a hospital.
- ***Rate of disease prevalence or incidence:*** Differences in the prevalence of certain diseases or conditions in the population are known to account for some variation in hospitalization rates. For example, the prevalence of asthma often varies with socioeconomic status. This may influence the number of individuals who are admitted to hospital on a regional basis.

ACS Hospitalizations for Severe ENT Infections



ACS Hospitalizations as a Percent of All Hospitalizations



- ***Physician practice patterns:*** The predisposition of a physician to admit an infant to hospital is based on medical, social, and geographic factors.
- ***Environmental factors:*** Deficiencies in housing, inadequate sanitation,

[13] Billings, J., Anderson, G. M., & Newman, L. S. (1996). Recent findings on preventable hospitalizations. *Health Affairs, 15(3),* 239-249.

[14] Bindman, A. B., Grumbach, K., Osmond, D., Komanomy, M., Vranizan, K., Lurrie, N., Billings, J., & Stewart, A. (1995). Preventable hospitalizations and access to health care. *Journal of the American Medical Association, 274,* 305-311.

[15] Casanova, C., & Starfield, B. (1995). Hospitalizations of children and access to primary care: A cross-national comparison. *International Journal of Health Services, 25(2),* 283-295.

and exposure to environmental risks may account for differences in the prevalence of certain diseases or conditions in the population.

- ***Personal access barriers for the parent or other caregiver:*** This includes a host of factors, such as problems obtaining time off work, arranging child care, or obtaining transportation, as well as language barriers and stability of the home environment.
- ***Economic barriers for the parent or other caregiver:*** This includes costs associated with medical aids, prescriptions, and travel to seek medical care.

Potential Impact

Changes in the rate of infant hospitalizations for ACS conditions may have an impact on the following outcome measures:

- ***Infant mortality:*** Serious illnesses that lead to hospitalization are more likely to result in death.
- ***Health status:*** An increase in the rate of hospitalization may be indicative of a general decline in health status for a population.

Opportunities for Action

- *Enhanced primary care service delivery to potentially high-risk segments of the population.*
- *Screening services for chronic conditions.*
- *Immunization clinics.*
- *Nutrition programs.*
- *Breastfeeding promotion strategies and support services.*
- *Education strategies to promote illness management skills of parents.*

What are the Limitations of this Indicator?

- Some ACS hospitalizations may be unavoidable. As well, the extent to which a hospitalization is avoidable may be a matter of degree.
- Hospitalization rates for ACS conditions may vary with the number of hospital beds available at a particular time or in a particular geographic region, not just with the delivery of primary care services.
- This indicator does not provide information on the component of the primary care system that is responsible for a particular client.
- Only the most severe conditions will result in hospitalization; therefore, this indicator does not provide information on the total number of individuals who are effected by a particular disease or condition.

Why Monitor this Indicator?

- ✓ To assess the need for programs and services, and therefore to establish priorities for the delivery of primary health services.
- ✓ To determine what types of interventions are most needed and to whom these interventions should be directed.
- ✓ To evaluate the effectiveness of an intervention. This may be facilitated by comparing rates of hospitalization before and after implementation of an intervention.

INDICATOR #3: ADOLESCENT PREGNANCY

Adolescent pregnancy can place a large burden on both the health system and society at large. Compared to women who become pregnant at a more advanced age, pregnant adolescents are at greater risk for delays in seeking prenatal care, infrequent or sporadic contacts with health professionals during the prenatal period, as well as poor nutrition and substance use during pregnancy. As a result, adolescents are more likely to have negative birth outcomes, including an increased risk of low birth weight, pre-term birth, medical complications for both the mother and infant during labour and delivery, and infant or maternal death.

Due to interrupted or curtailed educational opportunities, adolescent mothers are more likely to be unemployed or to work in low-paying jobs. This, coupled with the fact that adolescent mothers are often single parents, may result in poverty conditions for the family. As well, the children of adolescent mothers are at increased risk for developmental problems and poor school performance. This has implications for their future capacity in society.

Coordination and integration of adolescent health services is viewed as an important means of impacting on the number of adolescent pregnancies. As well, there is a need for consistent messages directed toward the adolescent population with respect to such issues as sexual health, the implications of early parenthood, and dealing with messages about sexuality depicted in the media.

Why Focus on this Indicator?

The adolescent pregnancy rate serves as an indirect measure of the number of females who are likely to experience difficult living conditions due to early motherhood. It also provides an indirect measure of the degree of sexual activity in the adolescent population.

Indicator Definition

Saskatchewan's adolescent pregnancy rate is derived from the number of live births, induced abortions, and fetal losses to females 10 to 19 years of age. Fetal losses include still births, spontaneous abortions (miscarriages), and abortions for which the cause is not known. Figures concerning the number of induced abortions, miscarriages, and abortions with an unspecified cause are obtained from hospitalization records. The pregnancy rate is expressed as the rate per 1,000 females 10 to 19 years of age.

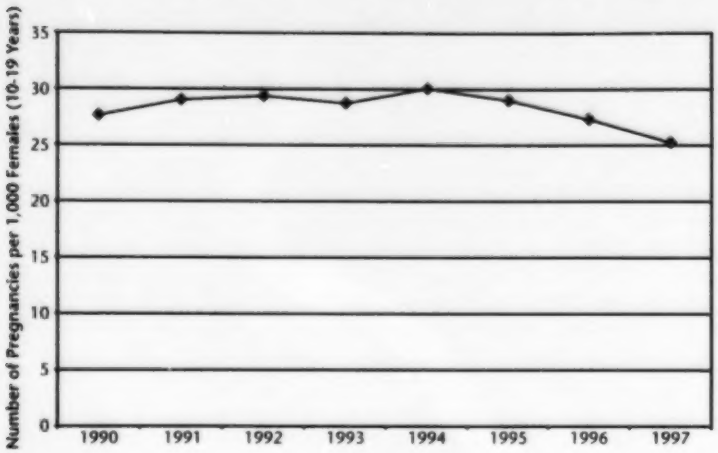
Indicator Results

In 1997, there was a total of 1,974 pregnancies to females 10 to 19 years of age; 70% of which resulted in a live birth.

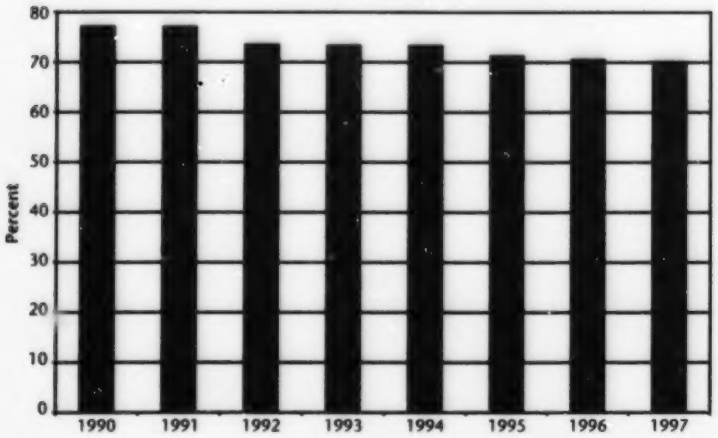
Only 33 (2%) of these pregnancies occurred in females under 15 years of age. The 1,383 live births to females 10 to 19 years of age in 1997 represents 11% of all births to Saskatchewan women in this year.

The provincial pregnancy rate in 1997 was 25 per 1,000. This is significantly lower than the 1996 rate, which was 27 per 1,000. The 1997 pregnancy rate for females 10 to 14 years of age was 1 per 1,000 which is equivalent to the 1996 rate.

Adolescent Pregnancy Rates, 1990-1997



Percent of Adolescent Pregnancies Resulting in Live Birth



Key Results

- *70% of all adolescent pregnancies result in a live birth.*
- *Only 2% of adolescent pregnancies occur to individuals under 15 years of age.*
- *Saskatchewan's adolescent pregnancy was lower in 1997 than in previous years.*

Since 1990, the first year for which data are compiled, the provincial rate of adolescent pregnancies has fluctuated. The highest rate in this time period was observed in 1994, when the rate was 31 pregnancies per 1,000 females 10 to 19 years of age. The lowest rate was observed in 1997.

National and Inter-Provincial Comparisons

Comparable national figures for adolescent pregnancy are available for the population 15 to 19 years of age only.[16] The most recent figures for Canada are from 1993, when the overall rate was 47.8 pregnancies per 1,000 females 15 to 19 years of age. In Saskatchewan in this same year, the rate among females 15 to 19 years of age was 57.9 per 1,000, while by 1997, the Saskatchewan rate for this age group had dropped to 50.7 per 1,000. The rates for Alberta and Manitoba in 1993 were 53.0 and 64.2 per 1,000, respectively.

What Influences this Indicator?

The factors that may influence the adolescent pregnancy rate include:[17, 18, 19]

- ***Unprotected sexual activity:*** Engaging in sex without the use of contraception increases the likelihood of pregnancy.
- ***Frequency of sexual activity:*** Increased frequency of sexual activity, with or without contraception, provides a greater opportunity for pregnancy to occur.
- ***Lack of knowledge of consequences of sexual activity:*** Some youth may

[16] Statistics Canada. *Reproductive health: Pregnancies and rates, Canada, 1974-1993.* Catalogue No. 82-568-XPB.

[17] Jacono, J. J., Jacono, B. J., St. Onge, M., Van Oosten, S., & Meininger, E. (1992). Teen pregnancy: A reconsideration. *Canadian Journal of Public Health, 83,* 196-199.

[18] Herold, E. S. (1994). Teenage sexuality and sexual health. *Canadian Journal of Public Health, 85,* 223-224.

[19] Mawer, C. (1999). Preventing teenage pregnancies, supporting teenage mothers. *British Medical Journal, 318,* 1713-1714.

not be aware of the potential outcomes of sexual intercourse.

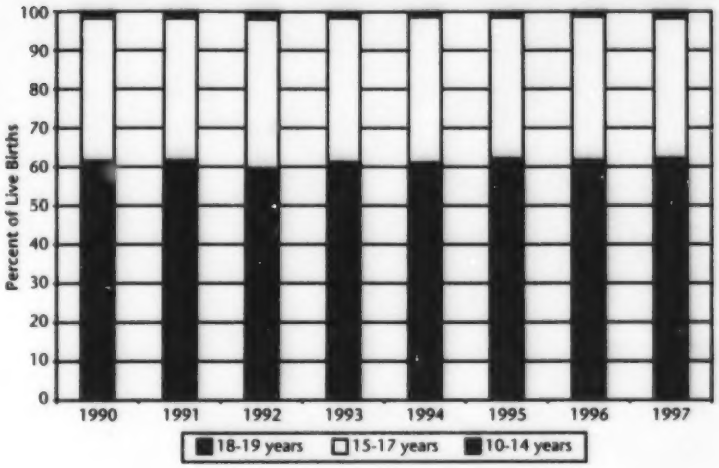
- ***Substance use:*** Alcohol and other substances that impair judgement may reduce one's inhibitions to engage in sexual activity and may also provide an indication of an individual's propensity for risk seeking.
- ***Availability of, and access to, contraceptive products and information.***
- ***Personal beliefs and attitudes concerning the value, morality, and effectiveness of contraceptive methods.***
- ***Personal values, beliefs, and attitudes concerning sexual activity.***
- ***Sexual beliefs and attitudes of peers and role models.***
- ***Personal aspirations:*** Career and education goals may influence an individual's willingness or desire to become pregnant at an early age.
- ***Self-confidence and self-esteem:*** An individual's level of self-confidence may influence her perceptions of pregnancy. An individual who has low self-esteem may find it difficult to encourage the use of contraceptives among sexual partners who are resistant to this idea.

Potential Impact

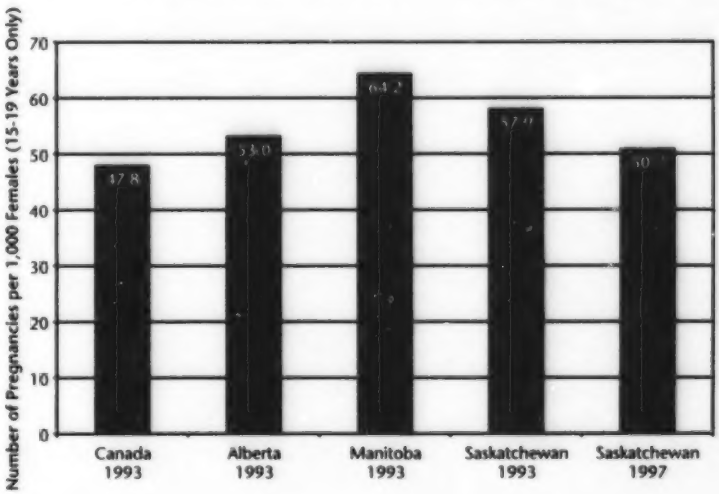
The adolescent pregnancy rate may have an impact on the following outcome measures:

- ***Childhood poverty:*** Adolescent mothers are more likely to be single mothers, and to be unemployed or employed in low-wage positions.
- ***Low birth weight:*** This may be due to a lack of timely or continuous prenatal care, prenatal nutritional inadequacies, and/or substance use during pregnancy.
- ***Infant mortality:*** Low birth weight babies have an increased risk of death during the first year of life.
- ***Early childhood development:*** Children of low birth weight are more likely to exhibit developmental problems. Some adolescent mothers may lack the skills and resources necessary to provide a stimulating environment for their young children. As well, adolescent mothers may experience difficulty in accessing the health and social support systems in order to obtain needed resources.

Live Births to Females 10-19 Years of Age



Comparison Figures for Adolescent Pregnancy



Opportunities for Action

To influence the adolescent pregnancy rate:

- *"Just say no" programs, which teach the benefits of abstinence and the skills necessary to refuse sex.*
- *Contraceptive distribution services.*
- *Sexual education programs.*
- *Life skills training.*
- *Family life education.*

To provide support or assistance to pregnant adolescents:

- *Counselling on pregnancy options.*
- *Prenatal nutrition counselling and nutrition programs.*
- *Counselling on risk behaviours such as substance use.*
- *Parenting preparation classes.*
- *"Mothers helping mothers" programs, which provide peer counselling and support.*
- *Postpartum home visitation programs.*
- *Breastfeeding promotion strategies and support services.*

What are the Limitations of this Indicator?

- This indicator does not distinguish between intended and unintended pregnancies. The latter includes unplanned, unwanted, and mistimed pregnancies.
- The extent to which a pregnancy is viewed as a negative life event for an adolescent may vary with the individual's age and ethnicity.
- The number of induced abortions may reflect the availability or accessibility of abortion services, and not necessarily the effect of interventions intended to reduce the number of adolescent pregnancies.

Why Monitor This Indicator?

- ✓ To examine the need for programs aimed at reducing the number of adolescent pregnancies.
- ✓ To identify opportunities for community-based support programs for pregnant adolescents and adolescent parents.
- ✓ To encourage discussions about the role of intersectoral partnerships to address this multi-faceted issue.

INDICATOR #4: INFANT MORTALITY

The infant mortality rate is one of the most widely recognized indicators of the overall health of a population. It provides an indication of the level of mortality, health status, and level of health care of a region. It also reflects the effectiveness of the preventive care network and the resources directed toward the health of mothers and children.

In addition, an infant death serves as a warning of possible deficiencies in the physical and socioeconomic environment, nutrition, education, or health of a community. Because infant deaths are rare, their occurrence signals a need to carefully evaluate the surrounding actions and events.

To decrease the rate of infant deaths in a community requires more than an increase in availability and accessibility of health care resources. Infant mortality is also a social problem, and thus a reduction in the infant death rate requires a multi-faceted approach.

Indicator Results

In 1997 the infant mortality death rate in Saskatchewan was 8.4 per 1,000. This is only slightly lower than the 1996 rate of 8.7 deaths per 1,000.

Recent research suggests that infants weighing less than 500 grams at birth should be excluded from calculation of the infant mortality rate.[20] The vast majority of these extremely low birth weight infants are not likely to live past their first birthdays, and indeed often die within the first few days of life. Thus, excluding these infants from mortality calculations might provide more stable and accurate rates across time. In Saskatchewan, there were 5 infants born weighing less than 500 grams in 1997; the infant mortality rate, adjusted for these births, was 8.0 per 1,000. In 1996, there were 10 infants born weighing less than 500 grams, and the adjusted infant mortality rate was 7.9 per 1,000.

[20] Joseph, K. S., & Kramer, M. S. (1997). Recent trends in infant mortality rates and proportions of low-birth-weight live births in Canada. *Canadian Medical Association Journal, 157*(5), 535-541.

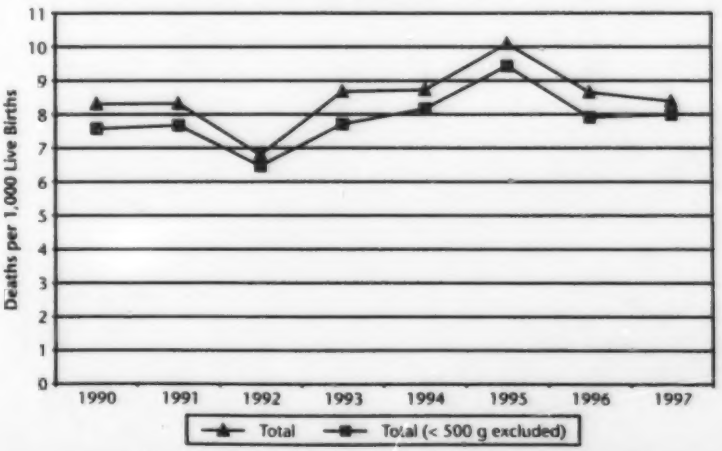
Why Focus on this Indicator?

The infant mortality rate is a commonly used measure of the overall health status of a population. It reflects not only the nature and quality of health care available to individuals, but also general social and economic conditions.

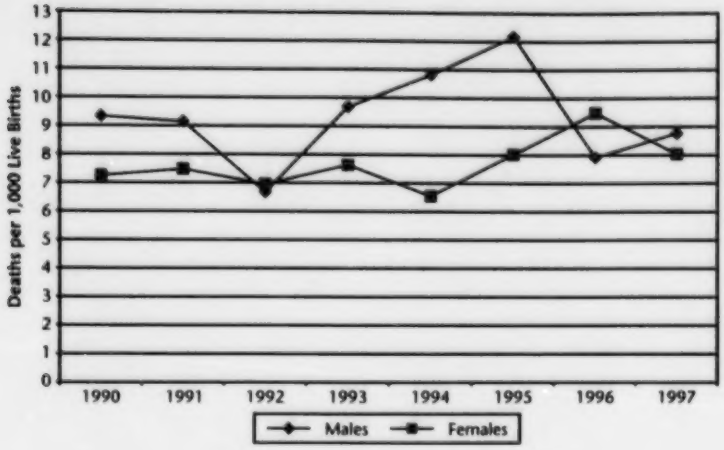
Indicator Definition

The infant mortality rate is calculated on the basis of the number of deaths to infants under one year of age. The rate is expressed as the number of deaths per 1,000 live births. Stillbirths are excluded from the calculation.

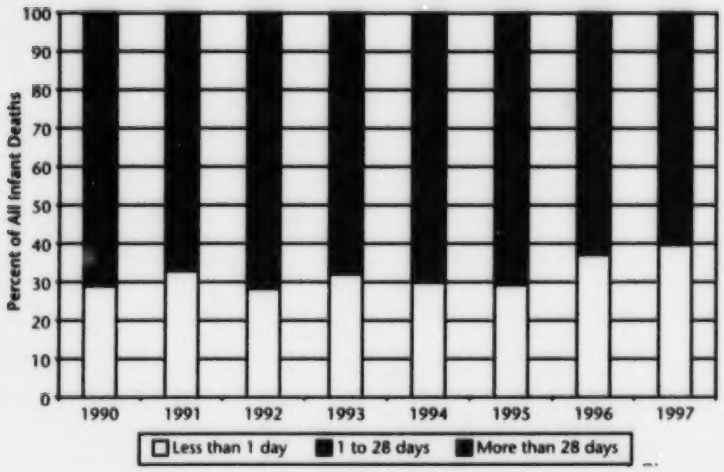
Infant Mortality Rates, 1990-1997



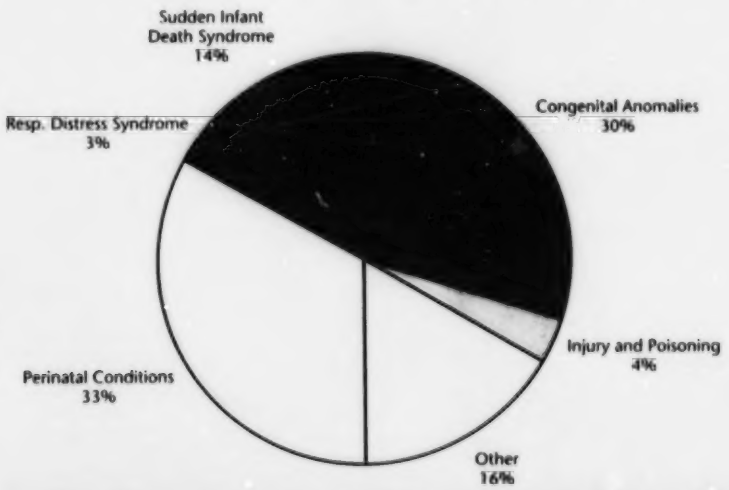
Gender Differences in Infant Mortality



Infant Mortality: Age at Death



Causes of Infant Deaths, 1993-1997



Since 1990, the first year for which data are compiled, the death rate among male infants has been higher than among female infants in all but two years: 1992 and 1996. The differences between the two sexes were statistically significant in both 1994 and 1995. The ratio of male to female deaths for the five-year period from 1993 to 1997 was 1.3, which is comparable to national figures.

Age at death has exhibited some change over time. In 1993, for example, 32% of deaths were to infants less than one day old; in 1997, 40% of deaths occurred among infants less than one day old. In 1993, 49% of infant deaths occurred after one month of age, while in 1997, only 30% of deaths were to older infants.

For the five-year period from 1993 to 1997, both congenital anomalies (30%) and conditions arising in the perinatal period (33%) were the leading causes of death among Saskatchewan infants. Sudden Infant Death Syndrome (SIDS) accounted for 14% of infant deaths in this time period.

Key Results

- *In 1996 and 1997, Saskatchewan's infant mortality rate remained close to 8 deaths per 1,000 live births.*
- *Infants less than one day old accounted for 40% of infant deaths in 1997.*
- *Congenital anomalies and conditions arising in the perinatal period are the leading causes of infant death.*

National and Inter-Provincial Comparisons

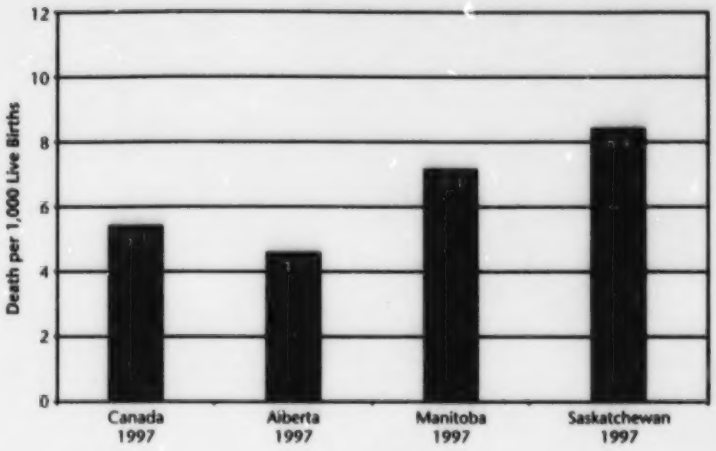
The most recent national figures reveal that in 1997, the infant mortality rate in Canada was 5.3 deaths per 1,000 live births, while in Alberta it was 4.7 and in Manitoba it was 7.1.

What Influences this Indicator?

The factors that contribute to the infant mortality rate include:[21, 22, 23]

- ***Low birth weight:*** This is the principal risk factor associated with infant mortality, as low birth weight babies account for the majority of all neonatal deaths.
- ***Lack of prenatal care or late entry into prenatal care:*** Timely and continuous prenatal care ensures screening to detect threats to the mother and fetus.
- ***Substance use:*** Exposure to alcohol and drugs can be harmful to the fetus. Smoking has been linked to an increased likelihood of having a low birth weight baby and is a factor in SIDS.
- ***Nutrition/diet during pregnancy:*** Good nutrition can contribute to improved birth outcomes. Poor maternal nutrition may result in an increased risk of having a low birth weight baby.
- ***Congenital anomalies:*** Infants born with certain non-trivial congenital anomalies are at increased risk for death, as well as disability later in life.

Comparison Figures for Infant Mortality



- ***Age of mother at pregnancy:*** Adolescents and women over 40 are at increased risk for having low birth weight babies.

Potential Impact

Changes in the infant mortality rate may impact on the following outcome measures:

- ***Children's readiness to learn:*** Because of such contributing factors as low birth weight and congenital anomalies, a high infant mortality rate may mean that more children enter school with learning disabilities and behavioural problems.
- ***Health status:*** Because of the contributions of such factors as low birth weight and substance use in mothers, a high infant mortality rate may mean that more children have poorer physical health, such as respiratory infections/illness due to impaired lung development.

[21] Dollfus, C., Patetta, M., Siegel, E., & Cross, A. W. (1990). Infant mortality: A practical approach to the analysis of leading causes of death and risk factors. *Pediatrics, 86(2),* 176-183.

[22] Millari W. J., & Hill, G. B. (1993). Prevalence of and risk factors for sudden infant death syndrome in Canada. *Canadian Medical Association Journal, 149(5),* 629-635.

[23] Muhajarine, N., D'Arcy, C., & Edouard, L. (1997). Prevalence and predictors of health risk behaviours during early pregnancy: Saskatoon pregnancy and health study. *Canadian Journal of Public Health, 88(6),* 375-379.

What are the Limitations of this Indicator?

- The crude mortality rate does not take into consideration such factors as birth weight and severity or length of illness. The exclusion of certain categories of infants (e.g., less than 500 grams) can alter the rates obtained and may help to ensure more stable rates over time.

Opportunities for Action

- *Prenatal nutrition counselling and nutrition programs.*
- *Prenatal counselling on the avoidance of risk behaviours.*
- *Postpartum home visitation programs.*
- *Neonatal intensive care.*
- *Infant injury prevention and safety awareness programs.*

Why Monitor this Indicator?

- ✓ To evaluate the impact of prenatal and postnatal intervention programs.
- ✓ To encourage intersectoral partnerships that may help to address the factors which contribute to the rate of infant deaths in a community.
- ✓ To stimulate discussion on infant mortality surveillance programs.

INDICATOR #5: AT-RISK BIRTH WEIGHT

Birth weight is a widely used indicator of the health status of a population. Low birth weight infants, those weighing less than 2,500 grams at birth, have been given particular attention because they are at greater risk for a number of health and developmental problems. As well, the rate of low birth weight infants has implications for health care resources such as neonatal intensive care. However, the rate of high birth weight infants has come under closer scrutiny in recent years because it is recognized as a significant emerging issue for the Aboriginal population. High birth weight infants, those weighing more than 4,000 grams at birth, are more likely to result in cesarean birth or complications in labour and delivery for both the mother and infant. As well, individuals born of high birth weight may experience an increased risk for certain health problems, such as obesity and diabetes, in later life.

Why Focus on this Indicator?

Low birth weight is considered by the World Health Organization to be an essential indicator in monitoring overall progress toward attaining a better state of health. Less attention is typically given to the rate of high birth weight babies, despite the fact that this is becoming a significant issue for the Aboriginal population.

Indicator Definition

The at-risk birth weight rate is calculated as the percentage of all live births for which the recorded birth weight is less than 2,500 grams (5 pounds, 8 ounces) or more than 4,000 grams (8 pounds, 12 ounces).

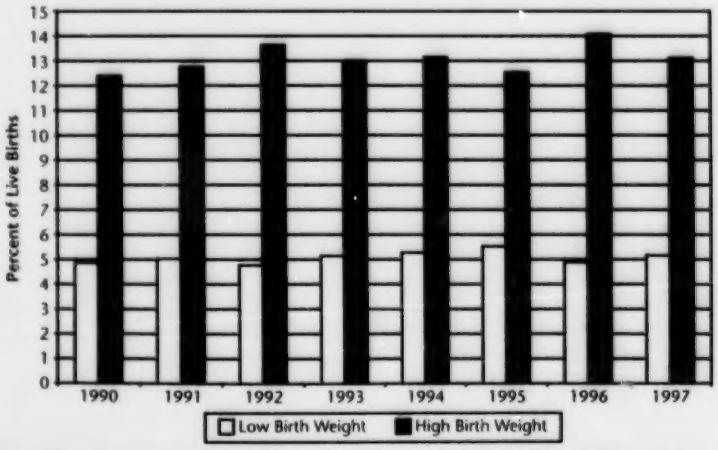
Indicator Results

In 1997, more than 2,000 infants were born with an at-risk birth weight; 28% of these were of low birth weight and the remaining 72% were of high birth weight. The overall rate of at-risk birth weight was 18%, which is only slightly lower than the corresponding 1996 figure of 19%. This difference, however, is not statistically significant.

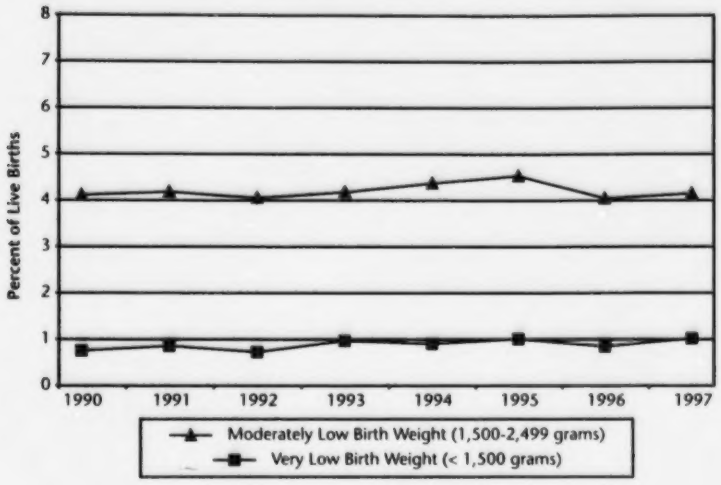
The low birth weight rate has remained relatively stable since 1990, the first year for which data are compiled, although a slight increasing trend was observed between 1992 and 1995. The rate dropped between 1995 and 1996, from 5.5% to 4.9%, then increased in 1997 to 5.2%. In 1997, 129 infants were born of very low birth weight, that is, weighing less than 1,500 grams (3 pounds, 5 ounces) at birth. This represents 20% of all low birth weight births, which is higher than the corresponding 1996 figure of 17%.

Pre-term birth, that is birth before the 37th week of gestation, is an established risk factor for low birth weight births. In 1997, 71% of all low birth weight babies were born before

At-Risk Birth Weight, 1990-1997



At-Risk Birth Weight Rates, 1990-1997



the 37th week. All but three (2%) of the 129 infants who were born with a very low birth weight (less than 1,500 grams) were premature.

The high birth weight rate increased sharply between 1995 and 1996, to a value of 14%, a result which was statistically significant. The rate decreased to 13% in 1997, but still remains higher than the 1995 figure.

Key Results

- *18% of live births in 1997 had an at-risk birth weight, of which 72% were high birth weight births.*
- *The low birth weight rate has remained relatively stable since 1990, and is presently 5.2%.*
- *Adolescents are at risk for having low birth weight infants, but do not appear to be at risk for having high birth weight infants.*

In 1997, women who were under 20 years of age had a low birth weight rate of 6.5%, compared to a rate of 5.0% for women 20 years or age or older. This difference is statistically significant. Although older women had a higher rate of high birth weight babies than those under 20, with values of 13.3% and 11.7%, respectively, this result is not statistically significant.

National and Inter-Provincial Comparisons

Statistics Canada figures for 1996, the most recent year for which data are available, reveal that nationally, the rate of low birth weight was 5.7%. In this same year, the rate for Alberta was 6.1%, and for Manitoba it was 5.4%.[24]

Comparative figures for the national rate of high birth weight are not presently available. However, a 1995 study found that the overall rate of high birth weight in Saskatchewan for the period 1975 to 1988 was 13%.[25] A US study of single full-term births occurring between 1990 and 1991 found that the rate of high birth weight was 12%.[26] Another study reported that the rate among Native Canadian women in the Sioux Lookout region of Ontario for the period 1990 to 1993 was 29%.[27]

[24] Statistics Canada. *Births and deaths, 1996.* Catalogue No. 84-210-XPB. Ottawa: Author.

[25] Dyck, R. F., & Tan, L. (1995). Differences in high birthweight rates between northern and southern Saskatchewan: Implications for Aboriginal peoples. *Chronic Diseases in Canada, 16,* 107-110.

[26] Kieffer, E. C., Alexander, G. R., Kogan, M. D., Himes, J. H., Herman, W. H., Mor, J. M., & Hayashi, R. (1998). Influence of diabetes during pregnancy on gestational age-specific newborn weight among US black and US white infants. *American Journal of Epidemiology, 147,* 1053-1061.

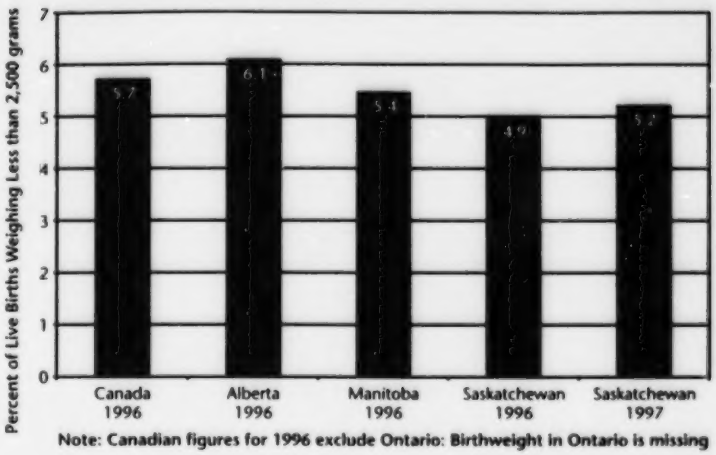
[27] Caulfield, L. E., Harris, S. B., Whalen, E. A., & Sugamori, M. E. (1998). Maternal nutritional status, diabetes and risk of macrosomia among Native Canadian women. *Early Human Development, 50,* 293-303.

What Influences this Indicator?

The factors which contribute to the incidence of at-risk birth weight include:[28, 29, 30]

- ***Substance use:*** Smoking has been linked to an increased risk of having a low birth weight baby.
- ***Pre-pregnancy weight and pattern of weight gain during pregnancy:*** Maternal obesity is highly correlated with an increased risk of gestational diabetes. Women who are of low weight when becoming pregnant and who have below normal weight gain during pregnancy have an increased risk of giving birth to a low birth weight baby.
- ***Inadequate nutrition/diet during pregnancy:*** Good nutrition can contribute to improved birth outcomes. A poor diet may result in either low or excessive weight gain for the mother and/or the fetus.
- ***Gestational diabetes:*** Women who suffer from gestational diabetes are more likely to have high birth weight babies. While gestational diabetes occurs in only about 3% of all pregnancies, the estimated rate of high birth weight among women who go untreated for this condition is 30%, while the rate for women who are treated for diabetes during pregnancy is estimated to be 12%.[31]
- ***Gestational age:*** Babies who are born premature (prior to 37 weeks gestation) are more likely to be of low birth weight, while those who are born postmature (42 weeks or more gestation) are more likely to exhibit high birth weight.
- ***Maternal age:*** Increased maternal age (i.e., 40 years or more) is a risk factor for gestational diabetes. As well, teens and women over 40 are at increased risk for having low birth weight babies.
- ***Ethnicity:*** Because of acculturation and accompanying changes in lifestyle and eating habits, Aboriginal individuals may be at greater risk for obesity and diabetes.

Comparison Figures for Low Birth Weight



Note: Canadian figures for 1996 exclude Ontario: Birthweight in Ontario is missing

Potential Impact

A change in the rate of at-risk birth weight may impact on the following outcome measures:

- ***Infant mortality:*** Low birth weight is the principal risk factor associated with neonatal mortality.

[28] Caulfield, L. E., Harris, S. B., Whalen, E. A., & Sugamori, M. E. (1998). Maternal nutritional status, diabetes and risk of macrosomia among Native Canadian women. *Early Human Development, 50*, 293-303.
[29] Dyck, R. F., Tan, L., & Hoeppner, V. H. (1995). Body mass index, gestational diabetes and diabetes mellitus in three northern Saskatchewan Aboriginal communities. Chronic Diseases in Canada, 16, 24-26.
[30] Saskatchewan Institute on Prevention of Handicaps. (1997). *Critical issues in health for Saskatchewan children: From birth to age nine, 1989-1994*. Saskatoon: Author.
[31] Canadian Task Force on the Periodic Health Examination. (1992). Periodic health examination, 1992 update: 1. Screening for gestational diabetes mellitus. Canadian Medical Association Journal, 147, 435-443.

High birth weight is associated with several perinatal complications, including an increased risk of neonatal death. Very low birth weight infants are almost always born premature, and the probability of death is very high, even with appropriate medical care.

- ***Early childhood development:*** Low birth weight children experience a substantially higher incidence of cerebral palsy than children born of normal weight. As well, low birth weight is a risk factor for a number of other conditions, including deafness, blindness, epilepsy, chronic lung disease, learning disabilities, and attention deficit disorder.
- ***Increased risk of diabetes in successive generations:*** A family history of diabetes is one risk factor for the development of diabetes.
- ***Maternal death rate:*** This is due to complications of labour and delivery for high and low birth weight births.
- ***Cesarean section rate:*** This is a result of non-progression of labour and problems with maternal pelvic size in high birth weight births and of pregnancy complications and premature birth in low birth weight births.

Opportunities for Action

- *Routine screening for gestational diabetes.*
- *Prenatal nutrition programs.*
- *Prenatal counselling for risk behaviours such as smoking.*

What are the Limitations of this Indicator?

- Because birth weight is linked to gestational age and to multiple births, live births occurring before the 37th week and after the 41st week of pregnancy, as well as those resulting in twins, triplets, etc. might be excluded in order to increase the comparability of figures.

- It is unclear, from current research, whether some of the risk associated with high birth weight births may be genetic in nature and thus, not amenable to preventive treatment.

Why Monitor this Indicator?

- ✓ To provide an indication of the need for neonatal medical resources.
- ✓ To provide an indication of the need for prenatal screening and counselling services for women who are at risk for delivering a high or low birth weight infant.
- ✓ To provide an indication of future health care needs, because individuals born with an at-risk birth weight are more likely to exhibit chronic health problems later in life and/or developmental delays.

INDICATORS UNDER DEVELOPMENT

Duration of Breastfeeding

Breastfeeding is a positive maternal behaviour. It is recommended that breastfeeding continue into the first year of life. However, at a minimum breastfeeding should occur for the first four to six months of life. Exclusive breastfeeding provides the maximum benefits to mother and child. Exclusive breastfeeding is defined as breastfeeding without the use of supplementary formula, other liquids, water, or solids. Exclusive breastfeeding does not preclude the use of oral medications.

Proposed Indicator Definition

Proportion of infants that are breastfed, either exclusively or non-exclusively, at two months of age and at six months of age.

What Influences this Indicator?

The factors that contribute to the rate of breastfeeding include:[32, 33]

- ***Ethnicity:*** Caucasian and non-Caucasian women may differ in their rates of initiation and duration of breastfeeding due to the influence of cultural values and beliefs.
- ***Maternal factors:*** Age, expectations, motivation, and previous experience in infant feeding may influence the rate of breastfeeding.
- ***Infant factors:*** These include infant health and temperament.
- ***Postnatal experiences:*** These include early and sustained mother-infant contact, frequent and unrestricted breastfeeding, no supplemental feedings, and social support.
- ***Societal norms concerning breastfeeding.***
- ***Work environment:*** Family leave policies, work at home policies, and time available at work to express breastmilk or to feed the infant may influence breastfeeding practices.
- ***Health care environment:*** Hospital policies concerning breastfeeding (separation, feeding schedules, supplementary or complementary formula feeding, distribution of free formula and bottles), attitudes of health care providers, and the type or quantity of information provided to new mothers may influence the initiation of breastfeeding.
- ***Prenatal education:*** The amount and quality of breastfeeding information provided in prenatal education sessions may influence a woman's decision to breastfeed.

Potential Impact

A change in the rate of breastfeeding may impact on the following outcome measures:

- ***Infant morbidity and mortality:*** Infants who are breastfed have increased protection against acute

[32] Canadian Institute of Child Health. (1996). *National breastfeeding guidelines for health care providers.* Ottawa: Author.

[33] Williams, P. L., Innis, S. M., & Vogel, A. M. P. (1996). Breastfeeding and weaning practices in Vancouver. *Canadian Journal of Public Health, 87,* 231-235.

and chronic illnesses such as respiratory, ear, or gastrointestinal infections, and meningitis, as well as SIDS. As well, breastfeeding has been shown to be an important preventive measure for infants when there is a family history of eczema, asthma, and food allergies.

- ***Maternal health:*** Breastfeeding is associated with a reduced risk of breast and ovarian cancer.

Opportunities for Action

- *Prenatal education sessions.*
- *Breastfeeding support services, such as telephone hotlines and clinics.*
- *Infant nutrition classes.*
- *Hospital policies concerning rooming-in practices, infant-child contact, supplementation, formula distribution.*
- *Postpartum visitation programs.*

What are the Limitations of this Indicator?

Breastfeeding is, to a large extent, a social phenomenon. Changes in breastfeeding rates may be due more to social attitudes and values, than to changes in availability or quality of educational and promotional materials and/or resources.

Why Monitor this Indicator?

- ✓ To evaluate the effectiveness of promotional efforts for increasing breastfeeding.
- ✓ To identify groups of individuals who are risk for non-exclusive breastfeeding or for complete lack of breastfeeding.

Postpartum Contacts

Contacts by community health professionals with new mothers in the immediate postpartum period are an opportunity for maternal support in a critical transition period. Research suggests that high risk, low income families can derive particular benefit from contact with community health professionals in the postpartum period.

Proposed Indicator Definition

Proportion of mothers having an initial contact with a community health nurse or other community health professional within two weeks of hospital discharge or delivery.

What Influence. this Indicator?

The factors that contribute to the proportion of new mothers having contact with health professionals in the early postpartum period include:

- ***Family mobility/geographic location.***
- ***Responsiveness of mother to contact with a community health nurse or other community health professional.***
- ***Early maternal discharge hospital policies.***
- ***Presence of a telephone in the home.***
- ***Priority assigned to initiating contact with at-risk population groups.***

Potential Impact

A change in the rate of postpartum contacts may impact on the following outcome measures:[34, 35]

- ***Rate of breastfeeding:*** Women who do not receive support and assistance in breastfeeding may be more likely to discontinue this activity at an earlier date than those women who receive support.
- ***Inadequacies in the infant's environment:*** Community health nurses and other community health professionals may provide needed information on infant care and nourishment.
- ***Inadequacies in the mother's environment:*** Community health nurses and other community health professionals may provide information on the needs of the mother in the early postnatal period.
- ***Future postpartum contacts:*** The initial postpartum contact may help to identify those families who are in need of further education and support.

What are the Limitations of the Indicator?

- Even with postpartum contact, there is no guarantee that mothers will ask for or receive the information they need.

- A single visit may not be sufficient to address all concerns of first-time mothers or to deal with problems arising later in the first year of life.

[34] Edwards, N. C., Mackay, P. G., & Schweitzer, I. (1992). The provision of public health nursing follow-up services for postnatal clients in Ontario: A cross-sectional survey. *Canadian Journal of Public Health, 83,* 200-202.

[35] Olds, D. L., & Kitzman, H. (1990). Can home visitation improve the health of women and children at environmental risk? *Pediatrics, 86,* 108-116.

- Compared with mothers having a second or subsequent child, mothers having a first child may require a greater level of postpartum support.

- The proportion of mothers receiving an initial postpartum contact does not provide information on the quality of these contacts or the time spent with a new mother.

Why Monitor this Indicator?

- ✓ To increase understanding of the types of resources that are directed towards the provision of maternal support in the early postpartum period.
- ✓ To aid in the identification of groups of individuals who may be missed in the provision of postpartum support services.

APPENDIX A

TECHNICAL SPECIFICATIONS FOR INDICATORS

Prenatal Care

Definition

Percent of women giving birth to live, singleton infants who are identified as receiving adequate prenatal care.

Numeric Calculation

$$\frac{\text{Number of women classified as receiving adequate prenatal care}}{\text{Total number of women giving birth to a live, singleton infant and having at least one visit to a physician during the gestation period}} \times 100$$

Scoring Algorithm for the Kessner Index

	Gestation (weeks)		*# of Prenatal Visits*
Adequate	13 or less	and	1 or more or not stated
	14-17	and	2 or more
	18-21	and	3 or more
	22-25	and	4 or more
	26-29	and	5 or more
	30-31	and	6 or more
	32-33	and	7 or more
	34-35	and	8 or more
	36 or more	and	9 or more
Inadequate	14-21	and	0 or not stated
	22-29	and	1 or less or not stated
	30-31	and	2 or less or not stated
	32-33	and	3 or less or not stated
	34 or more	and	4 or less or not stated
Intermediate	All combinations other than specified above		

Data Source

Numerator: Billing claims for prenatal care outpatient services and treatment, including diagnostic tests performed in a physician's office or laboratory. Data are compiled on a fiscal year basis, ending March 31.
Medical Services and Health Registration Branch, Saskatchewan Health.

Denominator: Birth certificates for the year ending December 31.
Vital Statistics records, Corporate Information and Technology Branch, Saskatchewan Health.

Data Issues

- The methodology used to define prenatal care visits to physicians is similar to one adopted by Mustard and Roos (1994)[36] in a Manitoba study of prenatal care and its relationship to birth outcome.

- The time frame for counting the number of prenatal care visits was established using the gestational age as recorded on the birth certificate. The gestational age is reported in full, completed weeks. The period of time extending from one week prior to the gestational period, up to, and including the date of birth as recorded on the birth certificate, was used to establish the prenatal period.

- The number of births to Saskatchewan residents are obtained from:
  - Saskatchewan and Alberta Vital Statistics records for births occurring in those provinces;
  - Saskatchewan hospital claims for births occurring in other provinces.

- Births to Saskatchewan residents occurring outside of hospitals in places other than Saskatchewan and Alberta are excluded from the calculations.

- Billing claims for physician services are compiled for residents of Saskatchewan only.

Avoidable Hospitalizations of Infants

Definition

Number of hospitalizations for ambulatory care sensitive (ACS) conditions for infants under one year of age, expressed as a rate per 1,000 infants.

Numeric Calculation

$$\frac{\text{Number of hospitalizations for ambulatory care sensitive conditions for infants under one year of age}}{\text{Total number of infants under one year of age}} \times 1{,}000$$

Identification of ACS Conditions

Diagnoses that are classified as ACS conditions for children under one year of age include:

- Congenital syphilis
- Immunization-related and preventable conditions
- Grand mal/epileptic convulsions
- Severe ear, nose, and throat infections
- Pulmonary tuberculosis
- Other tuberculosis
- Bacterial pneumonia
- Asthma

[36] Mustard, C. A., & Roos, N. P. (1994). The relationship of prenatal care and pregnancy complications to birthweight in Winnipeg, Canada. *American Journal of Public Health, 84,* 1450-1457.

- Cellulitis
- Diabetes
- Hypoglycemia
- Gastroenteritis
- Kidney/urinary infections
- Dehydration/volume depletion
- Iron deficiency anemia
- Nutritional deficiencies
- Failure to thrive
- Dental conditions

These ACS conditions have been grouped into the following categories to facilitate interpretation:
- Chronic diseases: diabetes; asthma; hypoglycemia
- Severe ear, nose, and throat infections
- Pneumonia: bacterial pneumonia
- Convulsions: grand mal/epileptic convulsions
- Gastroenteritis: gastroenteritis; dehydration/volume depletion
- General infections: congenital syphilis; immunization-related and preventable conditions; pulmonary and other tuberculosis; cellulitis; kidney/urinary infections
- Nutritional: failure to thrive; nutritional deficiencies; iron deficiency anemia
- Dental: dental conditions

Data Source

Numerator: Hospital separation records for the fiscal year ending March 31. Acute and Emergency Services Branch, Saskatchewan Health.

Denominator: Covered population records for the year ending June 30. Corporate Information and Technology Branch, Saskatchewan Health.

Data Issues

- Hospitalizations for ACS conditions are identified on the basis of the primary and secondary diagnoses indicated on hospital separation records. The primary diagnosis is the most important condition displayed by an individual during hospitalization, or the diagnosis that required the greatest proportion of medical resources. Secondary diagnoses are additional conditions that influence treatment or care in hospital. Diagnoses are based on the International Classification of Disease, 9th revision (ICD-9).

- Hospitalization statistics are derived from hospital separation records supplied by short-term care facilities. Separations may be due to death, return to domicile, or transfer to another facility. An individual appears in the records as many times as a separation form is filed for him or her.

- Hospital separation records were identified for Saskatchewan residents under one year of age at the time of admission to hospital.

- Hospitalization episodes were used to develop the numerator, rather than discrete numbers of hospital separations. The latter may result in double (or triple) counting of individuals who are transferred between facilities for a single ACS condition or illness. A hospitalization episode includes those admissions to other facilities that occur either on the same day of the initial hospitalization, or the day following the initial hospitalization.

Adolescent Pregnancy

Definition

Number of pregnancies among females 10 to 19 years of age expressed as a rate per 1,000 females 10 to 19 years of age.

Numeric Calculation

$$\frac{\text{Number of live births, induced abortions, and fetal losses among females 10 to 19 years of age}}{\text{Total number of females 10 to 19 years of age}} \times 1{,}000$$

Data Source

Numerator: Birth certificates and still birth records for the year ending December 31.
Vital Statistics records, Corporate Information and Technology Branch, Saskatchewan Health.

Hospital separation records for the fiscal year ending March 31.
Acute and Emergency Services Branch, Saskatchewan Health.

Denominator: Covered population for the year ending June 30.
Corporate Information and Technology Branch, Saskatchewan Health.

Data Issues

- Induced abortions, spontaneous abortions, and abortions for which the cause is not specified are identified on the basis of the primary, secondary, and tertiary diagnoses indicated on hospital separation records. The primary diagnosis is the most important condition displayed by the patient during hospitalization, or the diagnosis that required the greatest proportion of medical resources. The secondary and tertiary diagnoses are the conditions that had an ancillary impact on treatment or care in hospital. Diagnoses are based on the International Classification of Disease, 9th revision (ICD-9). The following ICD-9 codes are included: spontaneous abortions (634), legally induced abortions (635), illegally induced abortions (636), and abortions for which the cause is not specified (637).

- The age at pregnancy is based on the calendar year in which a live birth or still birth terminated, and not the year in which conception took place.

- Hospital separation records were selected for Saskatchewan residents who were at least 10 years of age and not greater than 19 years of age at the time of admission to hospital.

- The number of births to Saskatchewan residents are obtained from:
  - Saskatchewan and Alberta Vital Statistics records for births occurring in those provinces;
  - Saskatchewan hospital claims for births occurring in other provinces.

- Births to Saskatchewan residents occurring outside of hospitals in places other than Saskatchewan and Alberta are excluded from the calculations.

Infant Mortality

Definition

Number of deaths of infants under one year of age, expressed as a rate per 1,000 live births.

Numeric Calculation

$$\frac{\text{Number of death of live-born infants under one year of age}}{\text{Total number of live births}} \times 1{,}000$$

Data Source

Numerator: Death certificates for the year ending December 31.
Vital Statistics records, Corporate Information and Technology Branch, Saskatchewan Health.

Denominator: Birth certificates for the year ending December 31.
Vital Statistics records, Corporate Information and Technology Branch, Saskatchewan Health.

Data Issues

- The number of births to Saskatchewan residents are obtained from:
  - Saskatchewan and Alberta Vital Statistics records for births occurring in those provinces;
  - Saskatchewan hospital claims for births occurring in other provinces.

- Births to Saskatchewan residents occurring outside of hospitals in places other than Saskatchewan and Alberta are excluded from the calculations.

At-Risk Birth Weight

Definition

Percent of live births with a recorded birth weight of less than 2,500 grams or more than 4,000 grams.

Numeric Calculation

$$\frac{\text{Number of live births weighing less than 2,500 grams or more than 4,000 grams}}{\text{Total number of live births}} \times 100$$

Data Source

Numerator: Birth certificates for the year ending December 31.
Vital Statistics records, Corporate Information and Technology Branch, Saskatchewan Health.

Denominator: Birth certificates for the year ending December 31.
Vital Statistics records, Corporate Information and Technology Branch, Saskatchewan Health.

Data Issues

- The number of births to Saskatchewan residents are obtained from:
  - Saskatchewan and Alberta Vital Statistics records for births occurring in those provinces;
  - Saskatchewan hospital claims for births occurring in other provinces.

- Births to Saskatchewan residents occurring outside of hospitals in places other than Saskatchewan and Alberta are excluded from the calculations.

APPENDIX B

STATISTICAL METHODS

Rate Calculations

When describing the results for a given indicator, it is common practice to apply the term *rate* to this numeric data. Hence, it is common to refer to the *indicator rate* in this report.

One generic definition of the term *rate* is:

$$\frac{\text{Number of occurrences of an event in a specific time period}}{\text{Population at risk for this event in the specified time period}} \times \text{base.}$$

In this formula, the term *event* refers to any observable activity or characteristic of the population. Thus, an event could be a hospital admission, a death, or a visit to a health professional. Key events in a population are used to describe health outcomes or health service utilization, and are the basis for developing health indicators.

Sometimes the term *rate* is used to refer to a proportion or percentage, where the same individuals can appear in both the numerator and denominator of a numeric calculation. An example of a proportion is:

$$\frac{\text{Number of persons who received an influenza vaccination and contracted influenza}}{\text{Total number of persons who received an influenza vaccination}}$$

To facilitate understanding of the numeric calculations used to derive a specific indicator, both the numerator and denominator of each indicator are described in Appendix A of this report.

Standardization of Rates

It is possible to standardize a rate for a geographic area, typically on the basis of the age and sex structure of the population, in order to ensure the production of results that are comparable to a standard population. Either a direct or indirect method may be used to standardize data.

The indicator rates presented in this report are crude, or unstandardized rates. This is because:

- Data are presently available for only a single time period for the prenatal care indicator. Standardization of this data is not necessary when no comparisons across time are made.
- The indicators associated with the infant population, that is, at-risk birth weight, avoidable hospitalizations of infants, and infant mortality could be sex standardized only. No single reference population has been identified for this project at this time, hence unstandardized rates have been reported.

Assessing Statistical Significance of Results

The method used to assess statistical significance of results is dependent on having person-level data for analysis. Person-level data allows for the identification of the number of times an event occurs for each member of the population. While some events, such as death, can only occur once for an individual, others such as hospitalization, can occur multiple times. Identifying the number of occurrences of an event is an important step in calculating the amount of variation in a data set. Calculation of a measure of variability is necessary in order to test for statistically significant differences among indicator results.

The unstandardized rate for an indicator can be expressed as:

$$\hat{R}_u = \frac{\sum_{i=1}^{n} y_i}{n},$$

y_i represents the number of occurrences on an event for the *i*th member of the population, and *n* represents the number of members of the population. The summation symbol, Σ, indicates that the individual values of y_i are summed, or added together.

The number of events for a single individual, represented by the term y_i, can assume different values, depending on how the event is defined. For example, if the event is hospital admissions for pregnancy complications, y_i can assume the following numeric values:

0 = no admissions for pregnancy complications
1 = one admission for pregnancy complications
2 = two admissions for pregnancy complications, and so on.

If, however, the event of interest is death due to pregnancy complications, which is a binary event, y_i can only assume two values:

0 = no death due to pregnancy complications
1 = death due to pregnancy complications.

A measure of variability is typically computed alongside any rate calculation. A formula for calculating the variance of a rate is:

$$s_u^2 = \frac{\sum_{i=1}^{n_j} (y_i - \hat{R}_u)^2}{n-1}.$$

The standard error is used to calculate a confidence interval, which can be used to assess the precision of results. The standard error of the rate is:

$$S_u = \sqrt{s_u^2 / n}.$$

An n% confidence interval for a rate is a range within which we are confident that the true value of the rate will lie n% of the time. The 95% confidence interval for a rate can be calculated as:

$$\hat{R}_w \pm 1.96 S_w .$$

In this report, any tests of statistical significance were conducted using a 95% confidence interval. For further details on this statistical methodology, the reader may refer to Carriere and Roos (1994).[1]

[1] Carriere, K. C., & Roos, L. L. (1994). Comparing standardized rates of events. *American Journal of Epidemiology, 140,* 472-482.

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The Health Indicator Project is directed by the Health District Advisory Committee Information Needs Working Group, which comprised the following members in 1999:

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